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MAY 7, 1887.

THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. XXI. REGULAR EDITION NO. 593.

ARCHITECTURE

ENGINEERING

DECORATION

CONSTRUCTION

TICKNOR & COMPANY

BOSTON, MASS.

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THE SANITAS "RIGHT-HAND" TRAP.

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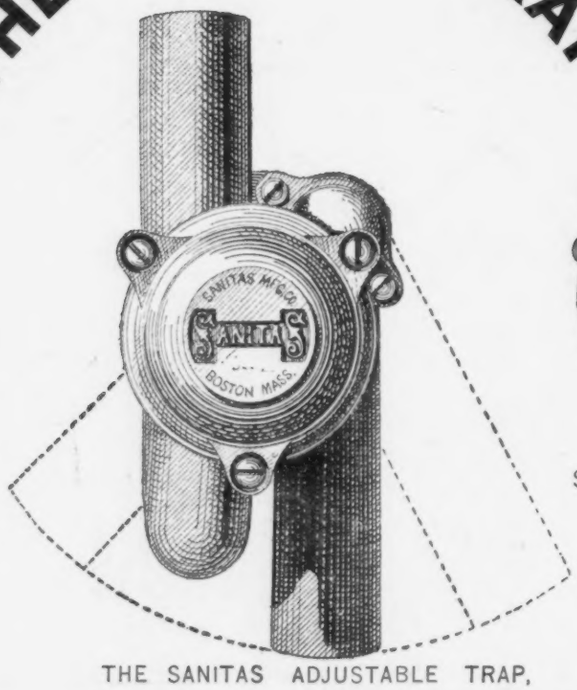
THE SANITAS TRAP.

The Sanitas Full S Brass Trap.



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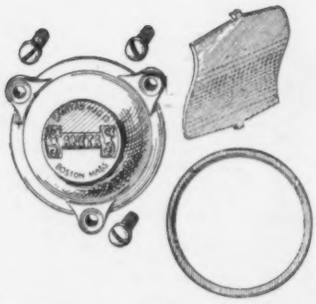

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THE past week or two has witnessed some curious manifestations of the rapid process of disintegration which is going on among the great labor organizations. One of the first important defections from the Knights of Labor occurred among the silver-smiths. These are usually intelligent, honest, and highly-paid men, but, in an evil hour, they listened to the exhortations of the paid enthusiasts and joined the "colossal organization." The number of persons in the trade is not large, and the labor autocrats, having got them securely bound, found it easy and convenient to use them for that great object of injuring their employers, in comparison with which, as Mr. Powderly says, "the suffering of the individual workman is of little importance." After the well-known methods of annoyance based on this view had been practised for some time, the masters rebelled, and gave notice that after a certain date all the principal silver-working establishments would be closed until assurance was given that the business conducted in them would be managed by their proprietors, and not by the "colossal organization." They were answered by the customary bragging and bullying, but they kept their word, and, on the appointed day, their doors were closed to all who chose allegiance to the Knights of Labor in preference to faithfulness to the service which they were employed to perform. The largest establishment of the kind in the country is that of the Gorham Manufacturing Company, which maintains eight hundred persons, all or nearly all of whom were members of the Knights of Labor. The managers of the Company, somewhat deceived by the vaporings of the knightly mouth-pieces, prepared themselves for a struggle of several months' duration, but their operatives, after considering for about three days the advantages of being ridden by a colossal organization as compared with those of working independently for the benefit of themselves and their families, voted to give up their knightly charter, and return at once to the places which still remained open to them.

IN another place, about the same time, an attempt was made by the managers of an International Union of Iron-workers to carry out the ordinary tactics of enforcing obedience to their orders by tormenting innocent people. It seems that a certain firm of stove-founders in St. Louis had incurred the malice of the International Union, which resolved to ruin its business. As it happens, the stove-founders of the country have a defensive association, the members of which help those of their fellows who are "struck" by making castings for them, in order to enable them to fill their orders, and in the present case, the patterns of the St. Louis establishment were divided among several firms in New York State belonging to the Association, in order that they might be used for casting. The International Union heard of this, and ordered its subjects to "strike" all foundries in which an attempt should be made to cast from the St. Louis patterns. The order was obeyed, and several hundred men, at a signal, gave up the employment by which they and their families subsisted in order to gratify one of the parties to a squabble a thousand miles away, of the merits of which they knew nothing whatever. As in the case of the silver-smiths, two or three days' reflection was enough to convince the stove-casters that the sacrifice they were making was altogether disproportionate to the occasion, and they voted to defy the orders of the International Union, and to go back to their work without troubling themselves further as to whether the patterns they were using came from St. Louis or elsewhere. Still further indications of the return of common-sense to the members of the "colossal organizations" are to be found in the results which have followed the adoption of the nine-hour day in the building trades. To hear the representations of the labor agitators, it would seem that the whole body of carpenters, plumbers and masons has for many years been sighing in vain for the reduction of the working day to eight hours, in order that they might have time to improve their minds; and that nothing but the heartless tyranny of "capitalists" and "monopolists" has prevented them from securing this precious privilege. In point of fact, however, since the orators have at last prodded their reluctant subjects into making a successful demand for a nine-hours' day, the latter seem to have taken to spending their leisure moments in revolving schemes for evading the new rules, and working ten hours instead of nine. In one case, within a week or so after the compromise which has become general, of nine hours' work and pay by the hour, had been adopted, the workmen employed by a large contractor went to him, and asked the privilege of working ten hours a day for the first five days in the week and five hours Saturday. This would make fifty-five hours' work in a week, instead of the fifty-four hours agreed upon in the compromise, but, as the men said, it would be so much more convenient for them to make full days the rest of the week and have Saturday afternoons to themselves for cultivating their gardens or amusing themselves and their families, that they would willingly give the extra hour's work for the sake of making the modified arrangement. We suppose that the labor quacks who heard of this must have wept at the backsliding of their unruly disciples, but the contractor, who had himself worked hard all his life, and knew the value of a half-holiday, thought the idea a very sensible one, and willingly agreed to pay the extra price for the extra hour in the week's work, although, according to the quacks, who maintain, when they wish to gain a point, that men do more work in a nine-hours' day than they do in one of ten, he would, by the modified arrangement, suffer a loss of five hours' work a week, instead of a gain of one, and ought to have docked his men of ten per cent of their wages, instead of giving them more. Unless this view of the case should occur to the contractor, it is easy to see that other men will ask the same privilege, and the result of the modification in the agreement will be that in the autumn, when the crops have been gathered from the little garden, and it is too chilly for picnics with the children, the men will, very gently, for fear the orators may hear them, begin to propose that the Saturday half-holiday should be discontinued, and that on that day a full days' work should be accepted and paid for. We venture to say that unless some meddler interferes, none of the men will suggest a return to nine hours for the other days of the week in place of ten. and that matters will quietly fall back to the condition in which they have usually been during the winter, except that the contractors will have gained the point against which the agitators have fought so hard, of paying by the hour instead of by the day. Whether the labor autocrats will look on quietly at this dodging of their decrees remains to be seen. To them, disregard and neglect are fatal, and as they know perfectly well that their salaries and their influence depend upon making themselves conspicuous, it is very likely that the autumn may see some desperate movement concocted to upset the industrial world, and bring into renewed prominence the figures of the self-styled champions of labor.

THE rôle of critic is not a pleasant one, yet we are frequently disposed to regret that a mixture of motives prevents us from assuming it at times and applying what of caustic criticism there lies in our pen to saying many things which we feel ought to be said concerning some American architectural designs. The undesirableness of giving personal offense, except in cases of real necessity, is probably the chief feeling that prevents editors of architectural journals everywhere from saying

anything in disparagement of the designs they accept for publication, and yet they must feel, as we do, that a little wholesome criticism of a design laid before the reader's eyes would be, after people got used to it, the most useful and welcome thing an architectural journal could undertake for the benefit of its readers and the art at large. Custom or good sense makes such a course impossible, and the editor's aspirations to act the critic's part is almost wholly restricted to the rather unsatisfactory task of politely declining offerings which he would gladly accept for publication if he might only be allowed to say his say concerning them. This, of course, applies mainly to private work and unofficial designers. With public work and functionaries supported from the public purse the case is different, and editors should feel at liberty to save the public's credit and money whenever possible, no matter whose private feelings may be distressed. It is our duty, as it is our pleasure — usually — to lay before our readers the designs for Government buildings, prepared in the office of the Supervising Architect of the Treasury Department. This duty we cannot discharge to-day without entering our emphatic protest against, not the execution of the preposterous design that has been prepared for the Detroit post-office, for it is not supposable that such an abomination could really be built, but against such an inexcusable misemployment of time (we can't say talent), which is paid for from taxes in the proper dispensing of which we all have an interest. That any one could be found in the Supervising Architect's office who, in his waking hours, could put together such a creation as this would be bad enough, but that such a person should chance to have over him a superior officer so indiscreet as to put forward this thing of incongruous parts, no scale and less style, as the design for a building belonging to the United States is absolutely discouraging. It seems to us that after such an exhibition as this even the most obtuse legislator must see that the present method of obtaining designs for public buildings is a matter which calls for prompt action and total reconstruction. It is not necessary to suppose that the Supervising Architect himself made this design in order to hold him responsible for its eccentricities. The actual designer may have fairly valid excuses for what he did: he may have been trying to evolve *the* "American style"; he may not have known how far off the track he was straying; he may, even, have been playing a huge practical joke on his superior, fully believing that his comical conceit would be found out and his fun stopped before things went too far. But it is not easy to see how even the most easy-going person, in whom a few years of official life can hardly have nullified former architectural instincts, can hold himself blameless in such a matter. The worst of the matter is that there seems to be another designer in the office who is capable of turning out really creditable work, as, for instance, the design for the Galveston court-house, published a few weeks ago, and it seems strange that an official who passed the Detroit design should not have rejected the Galveston design, on the plea that if the first was good and proper the second must be bad and unallowable.

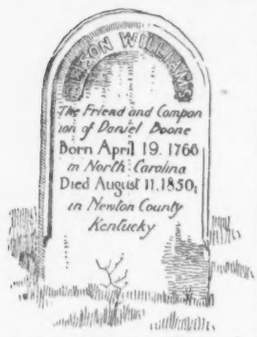
A LETTER printed in another column reminds us of a discussion which took place not long ago in the Royal Institute of British Architects, as to the duty of architects toward contractors. The discussion was introduced by Professor Kerr, who read a paper in which he conveyed the idea that architects ought to be guided by something better than technical literalness in interpreting so complex a matter as a building contract. Most of us, probably, have had the same idea, and have felt that the architect, who can judge better than either party to a building contract, as to the true meaning of its stipulations, or the value of the work to be done in accordance with them, ought to exercise a sort of abstract justice in deciding points under the agreement, so that the owner should come out of the affair with just what he ought to have, and the contractor with his fair dues and no more. Within certain limits this is perhaps a good principle, and the architect should certainly avoid anything like collusion with either party, to mislead or wrong the other, but he should be careful not to go too far in awarding what he thinks to be justice to one, at the expense of the other. To take a very common case, where the builder makes a mistake in his figures, and signs a contract for a sum insufficient to cover the cost of the work, the architect is not at liberty to do anything whatever to make good his loss at his client's expense. If he discovers the mistake in the estimate before the contract is made, he may, and would, we think, be legally bound to advise his client of it, and the latter could not then take advantage of a contract based upon an error of which he was aware; but if the agreement has been entered into in good faith by the owner, the architect cannot give away his client's money, to use the words employed by one of the participants in the discussion which followed the reading of the paper, even to make up a real loss on the part of the contractor. He may go to his client and put the case before him, leaving it to his generosity to make the contractor's loss good if he wishes, and in most cases the client is very willing to do so; but if he should not be willing, the architect can do nothing further. In many instances this seems rather hard, particularly where the contractor is a poor man, not much skilled in technical expressions; but it should not be forgotten that he takes the risk of his own mistakes, and, as he would hardly be likely of his own accord to hand back to the owner any part of his balance of profit in case the work proved much easier or less expensive than he thought it would, he cannot expect the owner to make good his loss if the error in calculation happens to be the other way.

IT would be interesting to know whether any of our readers remember anything about the Marquis de Foulon, who died in London a few weeks ago at the age of ninety-two. Few architects have had so romantic a history as this courtly old gentleman. He was born into the highest rank of the French nobility just as this haughty caste was overwhelmed by the revolt of the infuriated sans-culottes. The preceding Marquis, whether the father or the uncle of the architect, the *Builder* is not certain, is somewhat celebrated in history for the tragical fate which he suffered at the hands of the mob. A current report, the truth of which the younger Marquis always denied, accused the other of having laughed at the sufferings of the populace in the days just preceding the Revolution, and of having told some of them to "go and eat hay." Scores of similar tales were maliciously circulated about the aristocrats, and it is not very likely that this one had any foundation, but it was eagerly swallowed by the rabble, and one day, as the Marquis was driving with his wife through the streets of Paris, his carriage was set upon by a mob, and he was dragged out and murdered. The assassins then stuffed his mouth full of hay, and hung his body to a lamp-post. The family of the murdered noble, like most others of their own rank, fled from France, and the heir of the title, as soon as he was old enough, was obliged to earn his living. He became a pupil of Nash, the most fashionable architect of the day, and gained, by his high rank, admission to his master's house, where he often met the Prince Regent and the other leaders of that society which Thackeray describes. Soon afterwards he came to America, and, as the *Builder* says, "built more than one theatre in New York," but he found business dull, and the society of the Americans uncongenial, and returned to England, where he practised his profession for many years, a part of the time as a draughtsman in one of the public offices. Very few of our architects are old enough to remember much about the practitioners of fifty years ago, but there may be some one who can add something to this story of the achievements of a very grand seigneur with the T-square and drawing-board in place of his ancestral shield and sword.

EVERY few months some paragraph circulates through the newspapers in regard to the wonderful effect of the electric light upon plants. Not long ago it was observed that lilies which had closed at sunset opened again when an arc lamp in the neighborhood was lighted, and it has often been remarked that flowers keep much fresher in the evening in rooms lighted by electricity than in those with gas or candlelight. Beyond this, however, the effect of electric light appears to be rather injurious than beneficial to plants. Some years ago a rich amateur tried the experiment of illuminating a greenhouse with arc-lights. For a short time the plants appeared to flourish, and grew rapidly; but the growth was soft and unhealthy, no flowers appeared on the shoots, and the plants soon fell into atrophy and decay. Whether incandescent lights would produce the same effect or not, has, we believe, never been tried; but it is generally believed by florists that plants, like animals, need seasons of darkness and sleep, and that any light in a greenhouse at night is prejudicial to the health of its occupants.

EARLY SETTLER MEMORIALS.[1]—IX.

DANIEL BOONE.



DANIEL BOONE has always been regarded as the most distinguished pioneer of Kentucky, from the fact that he was the first white man who made a permanent settlement in the State, and underwent more fatigue, trials and hardships than any other man who ever visited the State at that early period. He was born in Bucks County, Pa., on the 11th of February, 1731. In 1769 he first visited Kentucky, and in 1775 founded the town of Boonesborough. In the same year his wife and daughters arrived from their home in North Carolina, the first white women, so far as known, who ever stood on Kentucky soil. Boone had been absent from his family three years, and during that time had never tasted bread or salt, nor beheld the face of a single white man, excepting his brother, and the friends who had been killed by the Indians. The vicissitudes which this great American pioneer passed through from 1771 to 1795, when he went to Missouri, are a history in themselves, and justly regarded by historians as greater than any romance, and as fully typical of the wondrous period of early pioneer life in America. Becoming greatly dissatisfied with the ill-fortune that attended him in Kentucky, he went to Missouri, and devoted the remainder of his life to the chase; even after his energies became enfeebled through age, he would wander to the remotest wilderness he could reach. As late as 1816 he made such an excursion to Fort Osage, a hundred miles from his residence. In 1819, a patriotic solicitude prompted an artist to visit him at his dwelling on the banks of the Missouri. Boone was found in a rude log-cabin, ill, and lying on his bed. A slice from the loin of a buck, twisted around the ramrod of his rifle, was roasting before the fire. His descendants occupied dilapidated cabins near by. He died of a fever in 1820, at the house of his son-in-law, in Flanders, Mo., at the age of eighty-nine years. Upon the announcement of his death the Legislature of that State, being in session, passed a resolution of respect to his memory, and voted that the members should wear the usual badge of mourning for thirty days.

At a session of the Legislature of Kentucky of 1844–5, measures were adopted to have the remains of Boone and his wife removed to the cemetery at Frankfort. This was done, and on September 13, 1845, the ashes of this venerable Western god were committed to their final repose. An immense concourse of people from all parts of the State was present on the occasion, and the ceremonies were deeply impressive. The hearse, decorated with evergreens and flowers, was drawn by four white horses. The pall-bearers were among the most distinguished military men of the State. A few years ago there was still standing, on the banks of the river, at Riverton, Ky., an old apple tree that Boone planted.

In the old graveyard near by the remains of his mother were believed to be buried. A large, square rock, inscribed, in plain but roughly-cut letters, D. B., 1775, was found in Mt. Olivet, five or six feet under ground, and between two posts standing perpendicularly in the ground. It is supposed that these initials were made by Boone, as he had spent some time in that neighborhood many years before.

The Boone Monument Association was incorporated by an act of the Legislature in 1848–9, for the purpose of erecting a memorial that should "manifest to the world the respect and gratitude of the descendants of the pioneers of Kentucky to those who first braved the perils of the dark and bloody ground." It was further enacted that "it was meet and proper that all the citizens of the State should have an opportunity of testifying their respect to these distinguished pioneers," Daniel and Rebecca Boone, his wife.

The monument was built in 1859, of Kentucky stone, by John Ialy, of Frankfort, after a design by Robert E. Launitz, of New York, and at a cost of $2,000.

It was placed over the graves of those to whom it was erected, in the midst of and beneath the over-reaching branches of large trees, and in a picturesque spot in the Frankfort cemetery. From it stretches out one of the most commanding views of the city.

The four bas-reliefs, in Italian marble, were executed by Mr. Korwan, for the designer of the monument and under his directions. Of both Korwan and Launitz we shall speak at length in another place.

Bas-relief, Number 1, represents Boone sitting at the door of his cabin.

Number 2. First meeting of Boone and Simon Kenton.

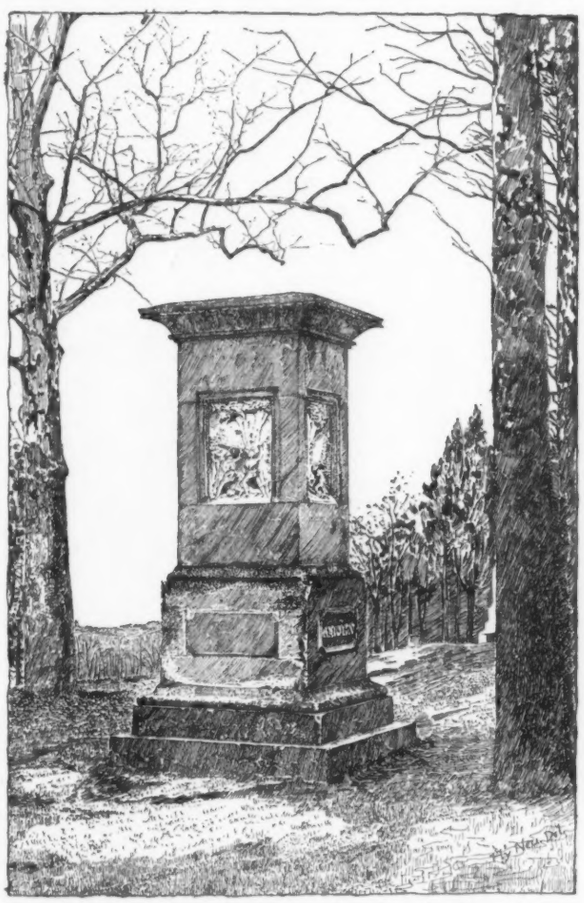
Number 3. Fight with Indians.

Number 4. Peaceful pioneer life.

The simple inscriptions on the monument are "Daniel Boone" and "Rebecca Boone." Of its character we have only to say that it is good, and of the sculpture, that it is the best that could be made in this country at that time. We wish that we could add that the irreverent relic hunter had passed it by.

The following beautiful lines from a poem by the late Col. Theodore O'Hara must close this short account of one of the bravest and most attractive characters in all early American history, and to the memory of whom a great State may well pay its grateful tribute, and to its own honor watch over a precious inheritance:

"A dirge for the brave old pioneer,
Knight errant of the wood:
Calmly beneath the green sod here,
He rests from field and flood.
The war-whoop and the panther's screams
No more his soul shall rouse;
For well the aged hunter dreams
Beside his good old spouse."



Monument to Daniel and Rebecca Boone, Frankfort, Ky. R. E. Launitz, Sculptor.

ELISON WILLIAMS.

Near the Boone monument is a plain headstone bearing the following inscription: "Elison Williams, the friend and companion of Daniel Boone, born April 19, 1766, in North Carolina. Died August 11, 1850, in Kenton County, Ky." Williams's devotion to Boone's memory was touchingly shown in his barefoot walk from Kenton County to Frankfort, in 1844, to act as one of the pall-bearers on the occasion of the re-interment of the remains of his comrade-pioneer. At his death he requested that his body should be buried near the grave of Boone. The Legislature passed an act in accordance with this wish, and erected in 1860 the above mentioned stone, at a cost of $50.

SIMON KENTON.

Simon Kenton was a principal actor in almost every important event that occurred in Kentucky until Indian aggressions were entirely quelled, which was about 1793. He was born, of obscure parentage, in Virginia, May 15, 1755. His father was an Irishman, and his mother of Scotch descent. A full account of his life would fill a volume, and exceed in thrilling scenes, tragic situations and human incidents the most vivid and fertile imaginings of the novelist. Like Boone, he was mercilessly followed by misfortune in his old age, and was finally arrested for debt, and for twelve months lay in a prison upon the very spot where he built his cabin, and planted the first corn in Kentucky. After much suffering he prevailed upon the Legislature to release the claims of the State upon his lands, in 1824. Soon after Congress granted him a pension of $240 a year, in order to secure his old age from absolute want.

He died in April, 1836, in sight of the place where, fifty-eight years before, the Indians proposed to torture him to death. No monument marks his grave.

HENRY CRIST.

In the same cemetery that contains the Boone monument there is

[1] Continued from page 160, number 588.

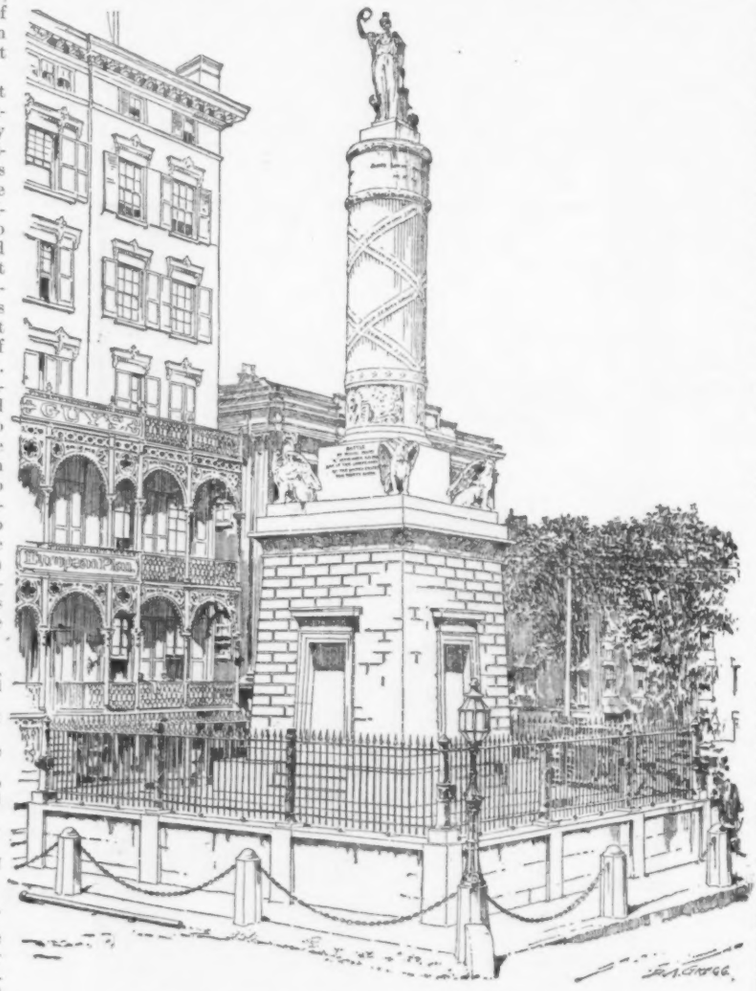
a simple memorial, also erected by the State, to the memory of Henry Crist, another pioneer whose enterprise and daring adventures largely contributed to the eventual prosperity of the settlements about Salt River and the Falls of Ohio. He was born in Virginia. While on a trip from Louisville down the Ohio and up Salt River on a flat-boat loaded with an outfit for his salt-works, he, with his party of thirteen, was suddenly attacked by a band of one hundred and thirty Indians at Rolling Fork. Nearly the entire party was killed, including Christian Crepps. Crist was shot in the heel, but the wound, unlike that of Achilles, did not prove mortal. The injury deprived him of the power of locomotion, and he lay down in the woods seven or eight miles from his camp to die. Finally, conquering his extreme pain and despair, he began to crawl toward the camp, trailing his journey with his blood as he cautiously and laboriously moved along. When almost in sight of the camp he fell exhausted, and made up his mind that death was inevitable. But a long and useful life was still in store for him. A settler chanced to pass near him, whom he managed, in a feeble voice to attract to his side. He was carried to the camp, and in after years became a member of the Legislature, and in 1808 a member of Congress. He died in Bullitt County in 1844, at the age of eighty years.

It is a recognized fact that the Frankfort cemetery contains not only many records of the history of Kentucky, but is an impressive evidence of its affection and gratitude for the men who have made her glory and her history. We do not know of another cemetery in the United States that can compare with it in State recognition of private and public worth. Its natural beauty is unsurpassed. It is situated on a hill more than two hundred and seventy-five feet above the city, which lies directly at its foot, to the westward. The beautiful poem of "The Two Villages," by Mrs. Rose Terry Cooke, has often been taken as a description of Frankfort and its cemetery; one verse we quote:

"Over the river, on the hill,
Lieth a village white and still;
All around it the forest trees
Shiver and whisper in the breeze;
Over it sailing shadows go
Of soaring hawk and screaming crow,
And mountain grasses low and sweet,
Grow in the middle of every street."

BALTIMORE MONUMENTS.

The city of Baltimore has long been popularly called, for several reasons, "The Monumental City." It built the first monument in memory of Washington; it caused to be executed the first statue in America of the Father of his Country; and it erected the first large military monument in the United States, as well as many other monuments to the memory and patriotism of its soldiers and sailors. Its devotion to and ready acknowledgment of the valor of its warrior sons has not been equalled by any city or State in the Union.



The Battle Monument, Baltimore, Md. Designed by J. M. M. Godefroy.

BATTLE MONUMENT.

The smoke had hardly cleared away above Stony Point and Fort McHenry, and the blood, shed so bravely by the citizens of Baltimore, had barely become a part of the earth where it fell, before the corner-stone of a monument was laid.

The battles of Stony Point and Fort McHenry were fought on the 12 and 13 of September, 1814. The first meeting of the Committee of Safety, held to consider the subject of erecting a monument in commemoration of those events, was held March 1, 1815. Public subscriptions were called for with the provision that they should be limited to not more than five dollars to each subscriber. The corner-stone, containing the original subscription-paper, was laid September 12, 1815. The design of the monument was made by J. M. M. Godefroy. The procession of military and civic bodies that formed part of the ceremonies of laying the corner-stone, had, for a distinctive feature, a funeral-car, surmounted by a plan of the intended monument and drawn by six white horses, richly caparisoned, and led by six men in military uniform, guarded by a company of soldiers. During the procession minute-guns were fired, the church bells were rung muffled, and all business was suspended.

"The shaft of the Monument presents a *fasces*, symbolical of the Union; the rods are bound by a fillet, on which are inscribed the names of the heroes killed, because by their glorious death they strengthened the bands of the Union. The fasces is ornamented at the bottom on the north and south fronts with the bas-reliefs, one representing the battle of North Point and death of General Ross; the other the bombardment of Fort McHenry. On the fronts, east and west, are lachrymal urns, emblems of regret and tears. On the top are wreaths of laurel and cypress, expressive of glory and mourning. Each centre of the Egyptian cornice is adorned with a winged globe; the globe represents Eternity, the wings, Time. The edifice is entirely of marble, surmounted by a colossal statue, representing the City of Baltimore: in one hand is a rudder, emblem of Navigation; in the other she raises a crown of laurel as she looks toward the field of battle. The Monument, without the statue, is 42 feet 8 inches high, and the statue 9 feet 6 inches high." The latter is the work of Antonio Capelano.

The following inscription appears on the monument:

BATTLE OF NORTH POINT
Sept. 12th, A. D. 1814, *and of the Independence of the U. S. the 39th.*
BOMBARDMENT OF FORT McHENRY,
Sept. 13th, A. D. 1814.

The monument was completed in December, 1825, at a cost of nearly $60,000.

The committee that erected this statue was not as hesitating and reserved in its feelings as were the men who made the Groton Monument, as this extract from their address to the people of Baltimore will show:

"To pay public honors to the memory of those who have fallen in defence of their country has been the usage of every age; and is recommended no less by sound policy than by gratitude, love of country, and all the most exalted feelings of our nature. The honors bestowed on our dead are the noblest incitements to virtuous deeds by the living."

Curious as this monument is, as a conglomeration of styles, symbols and emblems, it would have a right to claim exemption from criticism in consideration of the times in which it was erected, were it not for the existence of the Washington Monument in the same city, the corner-stone of which was laid in the same year. The latter structure has, as we shall find on further examination, certain art elements, harmonious and impressive. The Battle Monument is incongruous, and the part above the eagles is not impressive. Enlarged symbols and emblems, however touching in their significance, cannot perform the functions of architecture.

The Johnson Monument, at Frankfort, Ky., is the best specimen of this style to be found in this country, nor do we know of a better one anywhere.

If all the feelings growing out of the occasion could have made this monument a work of art, it certainly would have been one, for they were all there in the hearts of the grateful Committee of Safety and of the citizens generally. If the Washington Monument is to be taken

as an example of the art-intelligence of the people of Baltimore at the time of its erection, then the Battle Monument must be regarded as an expression of their weaker moments. For the former is not only a good monument for the time in which it was built, but it is the only columnar monument in the whole country, as well as the only monument in Baltimore, that is entitled to any serious thought. We

Johnson Monument, Frankfort, Ky. R. E. Launitz, Sculptor.

suspect that the real facts of the case are, that its existence is due solely to its designer, and not to the people, and that if a weak man had been in his place a second Battle Monument would have been erected. It is a fact in the history of art, not so generally remembered as it ought to be, that art is not produced without artists, and that, in the United States especially, the people, when left to themselves, or when they take it upon themselves to procure art, are not apt to choose the best. From an art point of view Baltimore owes more to the fortuitous existence of the designer of the Washington Monument than to its own intelligence, for its reputation as the "monumental city."

WASHINGTON MONUMENT.

The subject of a monument to commemorate the last act of the military life of Washington, the resignation of his commission at Annapolis, was considered by the citizens of Baltimore as early as 1809. To assist in paying the cost of such an undertaking the Legislature passed an act in that year authorizing a number of gentlemen to raise $100,000 by lottery. The corner-stone was laid July 4, 1815, by the Freemasons of the State and attended by the most extraordinary military and civic ceremonies, both in extent and character. It was intended to erect the monument on the spot occupied by the Battle Monument, but as many of the wealthy citizens had erected costly dwellings around the square, they were afraid that the contemplated high structure might fall, and thus destroy valuable property and perhaps life, so a friend of Washington's, Col. J. E. Howard, gave the site it now occupies, which, at that time, was covered with trees, but is now surrounded by a square measuring two hundred feet on each side. The design of the monument was made by Robert Mills, of Charleston, S. C., and it was constructed under his supervision. It is described as representing a Doric column twenty feet in diameter at the base, fourteen at the neck, and one hundred and twenty feet from base to top of capital. The base upon which the column stands is fifty feet square and twenty-five high. The whole height, including the statue, which is sixteen feet high, is one hundred and eighty feet. The monument was completed and the statue placed in position December 25, 1829. It is built entirely of white marble on the outside and of brick on the inside, and stands two hundred and eighty feet above tide water. The base is arranged for the reception of statues and busts, and contains a bust of Washington, representing him in his youth, and the plaster model, seven feet high, of the statue which surmounts the column.

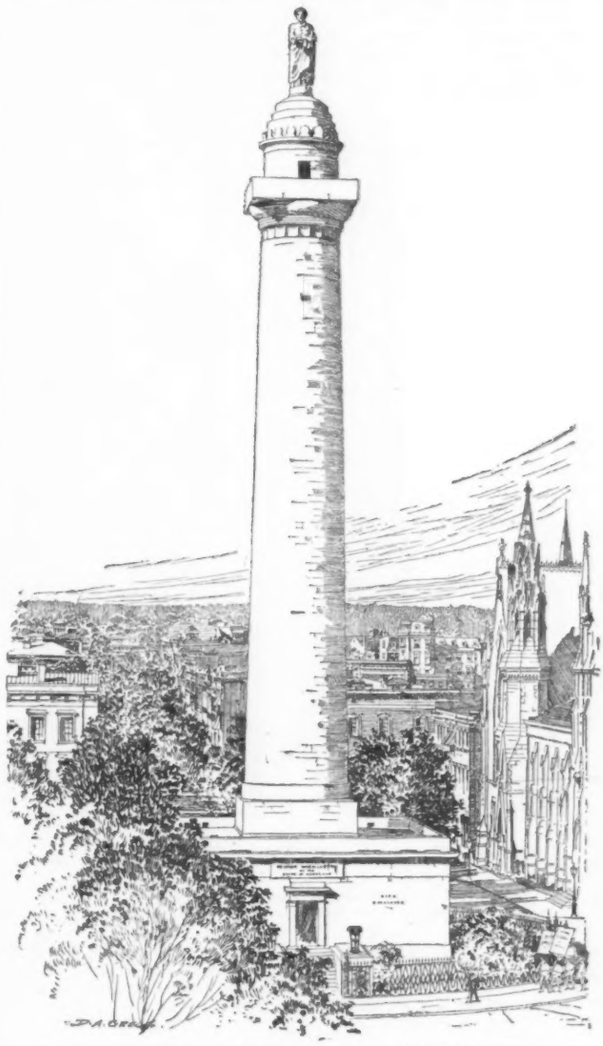
A circular stairway of two hundred and twenty-eight steps leads to the top.

The inscription, curiously divided into four parts, is placed upon the different sides of the base, and reads as follows:

TO
GEORGE WASHINGTON,
BY THE
STATE OF MARYLAND.
Born, February 22, 1732.
Commander-in-Chief of the American Army, June 15, 1776.
Trenton, Dec. 25, 1776. — *Yorktown, October* 19, 1781.
Commission resigned at Annapolis. Dec. 23, 1783.
President of the United States, March 4, 1789.
Retired to Mt. Vernon, March 4, 1797.
Died, December 14, 1799.

The statue represents Washington in the act of resigning his commission as General-in-chief of the Armies of the United States. It was made by André Causica, a Veronese sculptor, who had been employed in Washington in the execution of some bas-reliefs, and cost $17,000. The expense of its erection was $3,000. The cost of the entire monument was $200,000.

From an art point of view the Washington Monument is not only the most impressive structure of its kind in America, but it is freer from architectural faults than any other. Both of these points of superiority are due to the facts that a column ranks higher as an architectural form than an obelisk; that it will bear almost an endless enlargement, which the obelisk will not; and that, because of the higher art principles of its construction and nature, it will sustain



The Washington Monument, Baltimore, Md. Designed by Robert Mills.

more imperfections in its proportion and construction than the obelisk. The selection of a columnar monument on the part of the architect directly evidences his superior judgment and taste, and indirectly those of the committee that accepted it. Properly speaking, it is not a Doric column, but is a column-monument in the basic principles of its design; it belongs among the best examples of its kind in the world, unfortunately limited to only one superior example, that of the column of the Bastille.[1]

[1] See *American Architect* for June 25, 1881.

The genius of the architect deserves commendation for many reasons. He designed for the future: a fact so great and so seldom seen, perhaps we ought to say permitted, in this country, that it assumes an interest so gratifying that we are disposed to dwell upon it as though it were a new thing in the world. The site of the monument when it was first erected was in the middle of a wood far outside of the town, but now in the centre of the city. The architect took the largest view of his idea, that of a monument to be surrounded by a large space. He kept within the strictest limits of severity and dignity. These facts alone will preserve its claims to distinction, and entitles Baltimore to be regarded as the monumental city of the Union. It is a curious fact, though not an unexpected one in view of the monumental tendencies of the last twenty-five years, that the important architectural elements of the Washington Monument should have been completely ignored in all the column-monuments erected in this country. Not only ignored in these innumerable later-day structures, but in their stead are found all the faults that an evil ingenuity could conceive.

No lesson, suggestion, or involved art-principle has been derived from the Baltimore column. All the principles and purposes of a column-monument have been so degradingly subordinated, as may be seen in the illustrations of column-monuments erected in this country, that one is forced to think that art occupies a very small place in their design and purpose. The worst example of all is the Yorktown Monument.[1] Even Baltimore, with all its high sentiments of gratitude and enthusiastic patriotism, the Washington column, as a kingly point of departure, and the reputation it justly gives to the city to support, has steadily gone backward instead of forward in its monumental expressions. Its accessory claim to distinction, as shown in the Barye groups, is due to its distinguished citizen, Mr. W. T. Walters. Though it has produced a sculptor who possessed a rare art-temperament, the late W. H. Rienhart, it is enriched by his works only by his own generosity.

In the Washington Monument it undoubtedly employed the best architect then living in the United States. The shame is that it has neglected to follow that precedent.

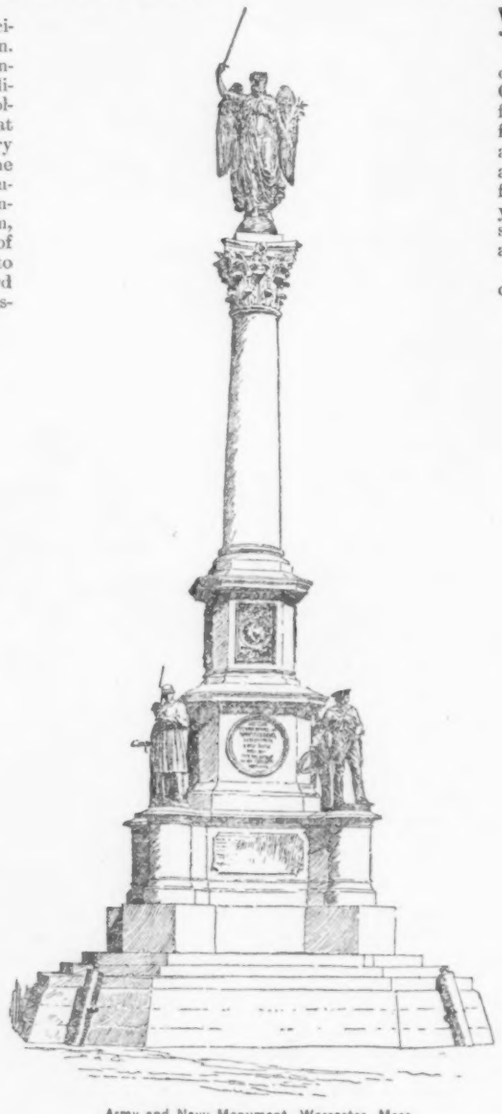
It should not be forgotten that the Stars and Stripes waved for the first time in October, 1775, in the harbor of Baltimore. Thirty-nine years later Francis S. Key wrote the "*Star Spangled Banner*," while a prisoner on board the British fleet on the morning after the bombardment of Fort McHenry. On Defender's Day of 1876 the last survivor of the battle, James C. Morford, aged ninety-one years, made his usual promenade around the Battle Monument, and saluted the shaft erected to the memory of his dead comrades.

T. H. Bartlett.

[To be continued.]

[1] See *American Architect* for October 15, 1881.

Soldiers' and Sailors' Monument, Buffalo, N. Y.
George Keller, Architect.



Army and Navy Monument, Worcester, Mass.
Randolph Rogers, Sculptor.

Soldiers' Monument, Lawrence, Mass.
Designed by M. J. Powers.

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

HOUSE ON BELLEVUE AVENUE, NEWPORT, R. I.

[Gelatine Print, issued only with the Imperial Edition.]

PORTIONS OF THE NEW FACADE OF S. MARIA DEL FIORE, FLORENCE, ITALY.

Through the kindness of Mr. W. P. Garrison we are able to publish views of two portions of the new façade of the Florence Cathedral, the presence of the scaffolding bearing testimony to the fact that the negatives were taken at the earliest opportunity. An attempt to do justice to the entire façade in one view would have yielded a result many times less satisfactory than even these details afford.

The mosaic-work in the lunette over the central door is the work of Prof. Niccolò Barabino, and represents the Virgin praying before her son. Other figures are those of St. John the Baptist, St. Anna, St. Lorenzo, St. Vittorio, St. Mary Magdalen, Pius IX, and others. The bas-relief in the tympanum above is the work of Prof. A. Passaglia, and represents the Virgin blessing the Christian world. The figures on either side are St. Catherine of Sienna, Calixtus III, Christopher Columbus and his friend Fra Giovanni Perez, Queen Esther, the Prophetess Deborah, Pius V, the Gonfaloniere and Prior of the Florentine Republic, who caused the cathedral to be built. In the spandrels on either side are shown some of Gideon's trumpeters assaulting the walls of Jericho.

The mosaic-work over the right-hand door is also by Prof. Barabino, and represents the "Triumph of Charity," the figures represented being those of the founders of various Florentine charitable institutions. The "Ecce Homo" in the tympanum above is by Professor Passaglia. The two large figures of Fathers of the Church

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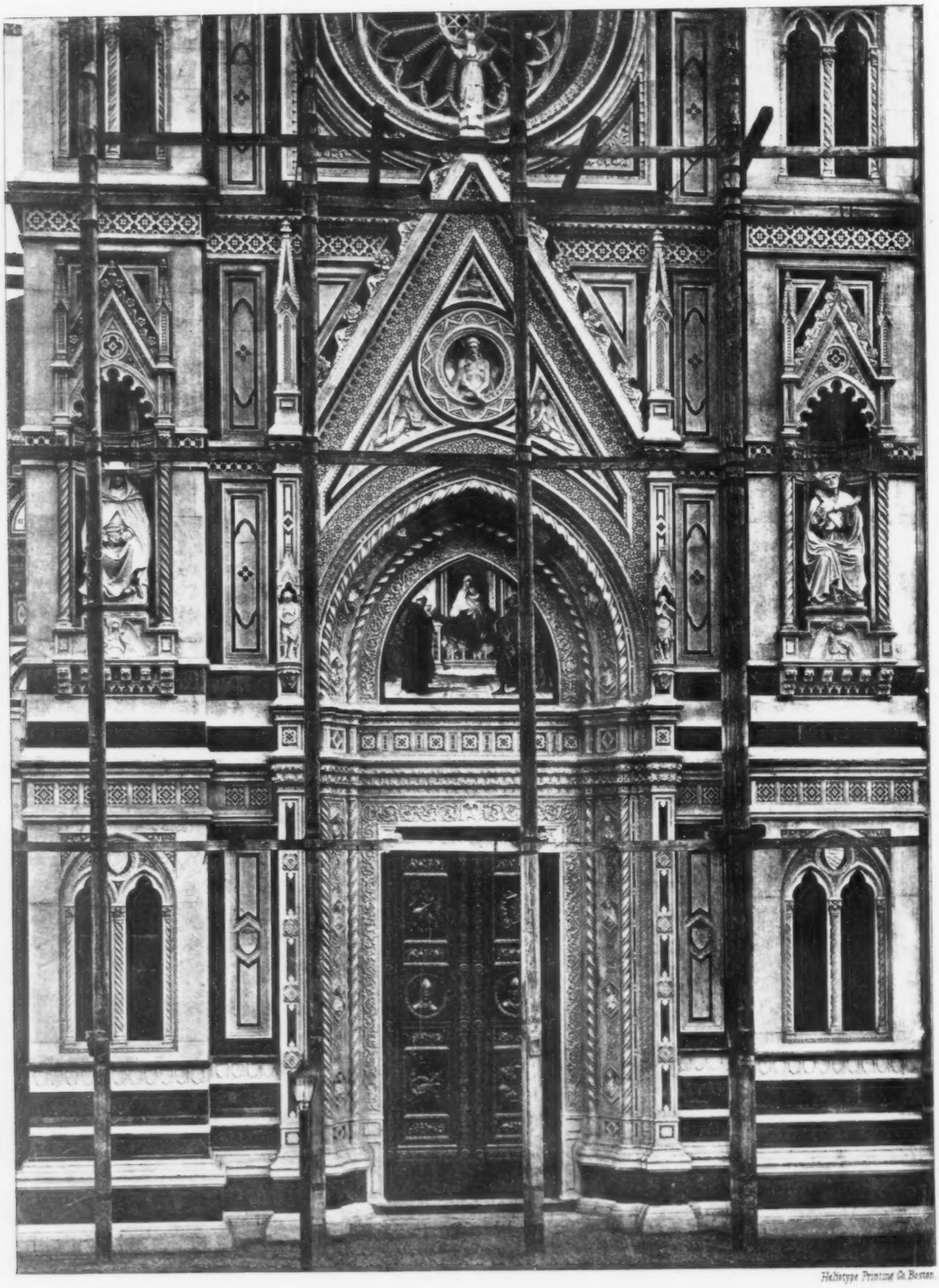

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Right hand Doorway. S. Maria del Fiore, Florence.

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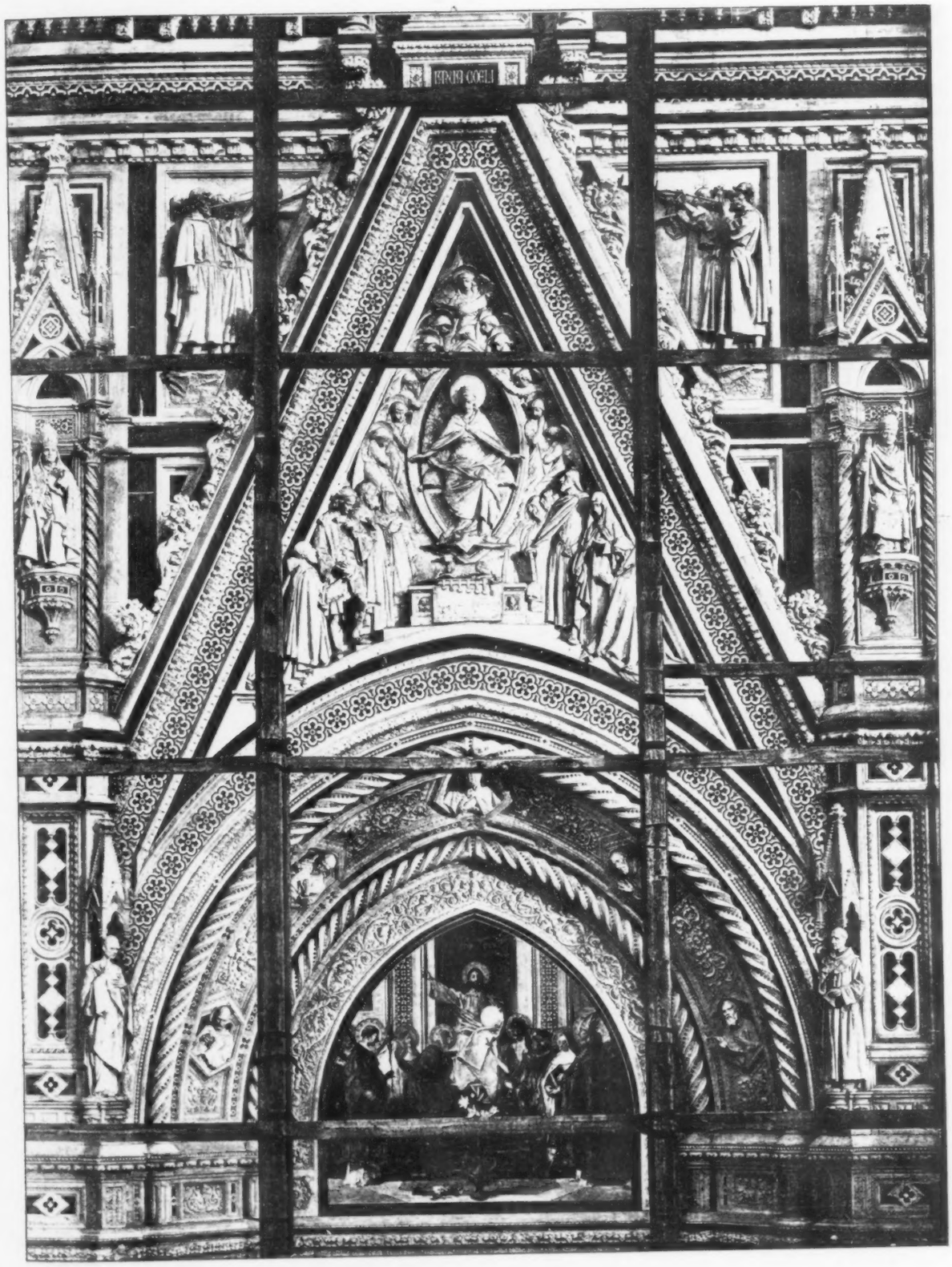

Detail of Main Entrance S. Maria del Fiore: Florence.

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· CHADWICK · LEAD · WORKS ····· BOSTON ·

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Design
FOR
U.S.CT.Hº P.O.&c.
DETROIT, MICH.

M.E. BELL.
Supervising Architect

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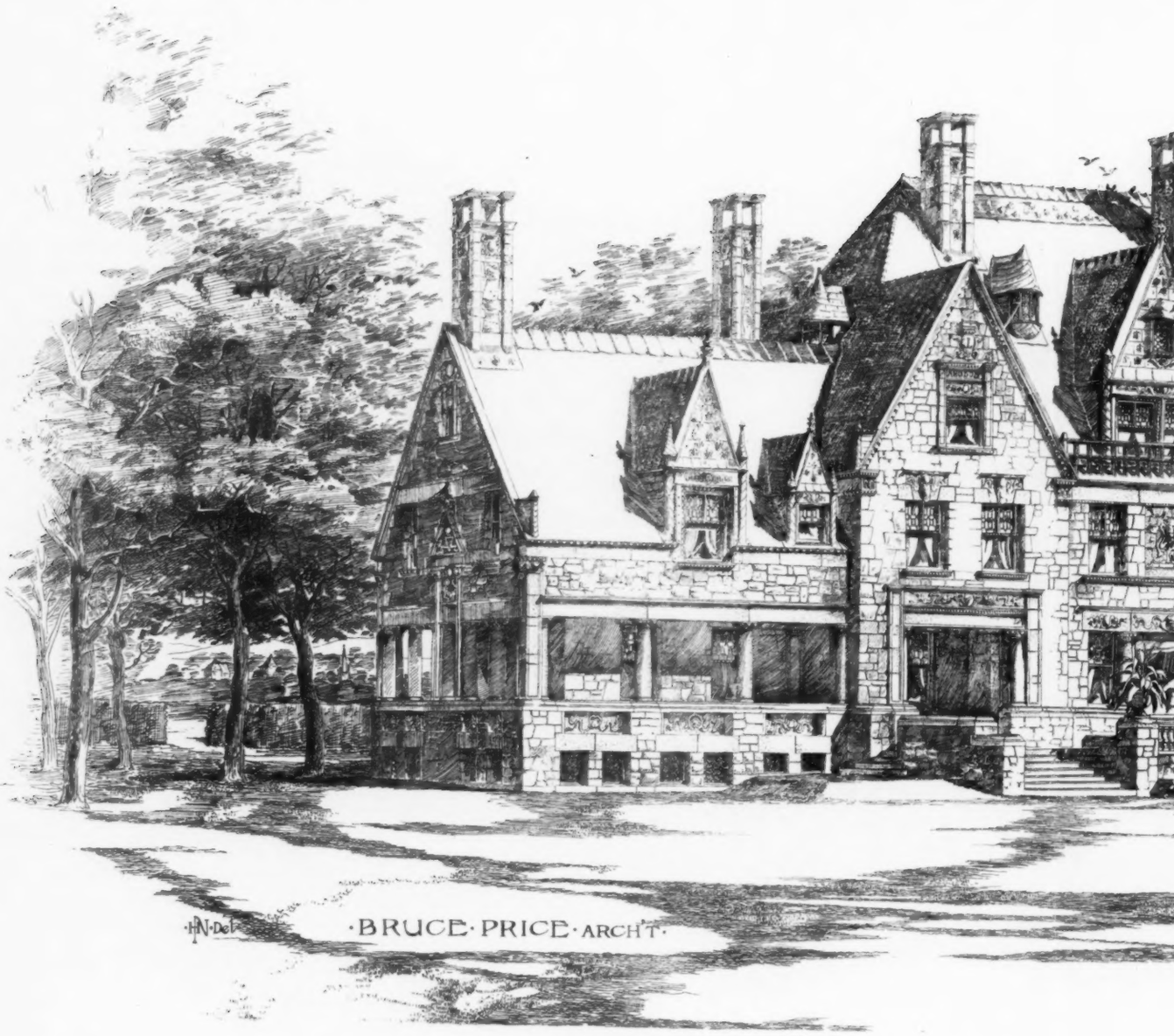
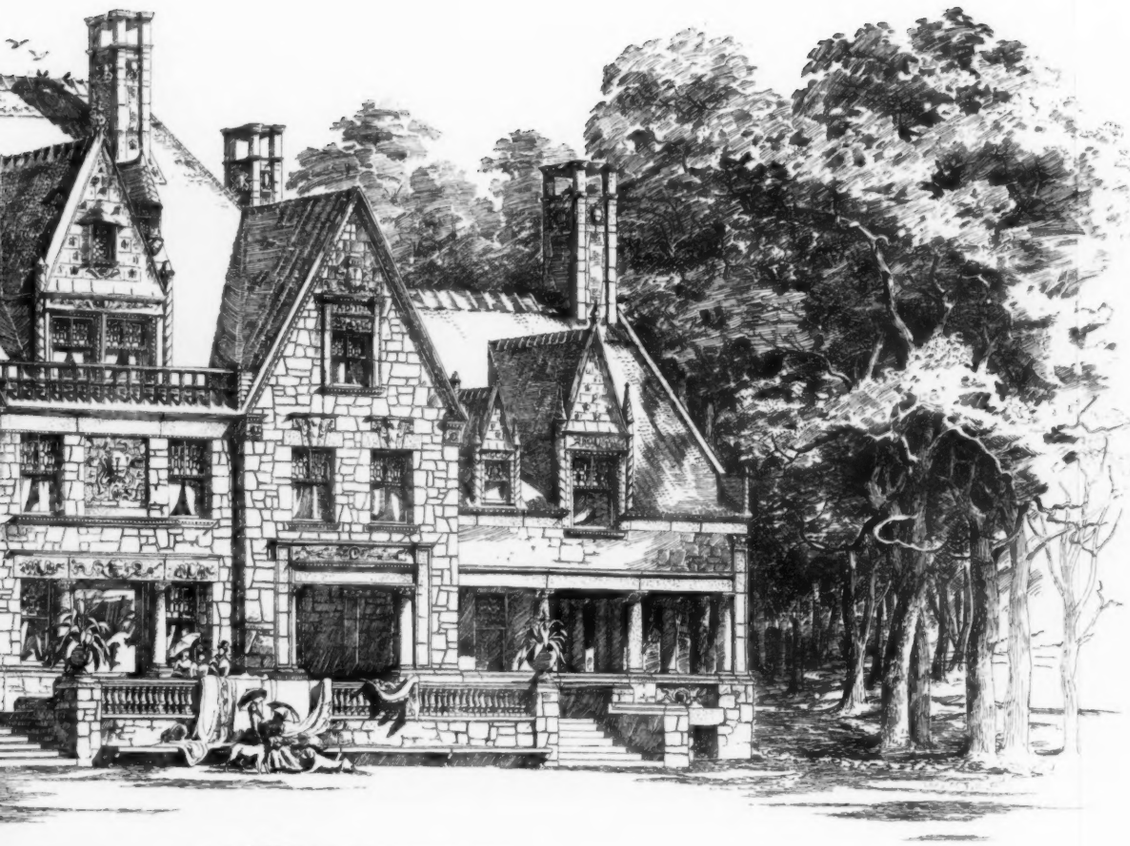




·STONE-ACRE·

Heliotype Printing Co. Boston.

in the large niches are by Dante Sodini, and the two small figures of Adam and Eve at either side of the central mosaic are by Prof. L. Torelli.

DESIGN FOR THE UNITED STATES COURT-HOUSE AND POST-OFFICE, DETROIT, MICH. MR. M. E. BELL, SUPERVISING ARCHITECT, WASHINGTON, D. C.

THE CHADWICK LEAD-WORKS, BOSTON, MASS. MR. W. G. PRESTON, ARCHITECT, BOSTON, MASS.

"STONE ACRE." MR. BRUCE PRICE, ARCHITECT, NEW YORK, N. Y.

S. MARIA DEL FIORE.

AMONG the developments of this age, so rich in the conception and carrying out of grand schemes, is a spirit of completing things which, striding from country to country of the Old World, is putting its stamp on so many time-honored and noble edifices hitherto beautiful indeed and majestic, but wanting in some important feature included in its design. The most conspicuous illustration of this is the Cologne Cathedral which, more than six hundred years after the laying of its foundation-stone, saw completed, a few years ago, as if by magic, its noble towers. About the middle of this century Rouen put a similar finishing-touch to her twelfth-century cathedral, and pierced the skies with perhaps the most airy and beautiful [!] spire ever constructed, a perfect marvel of stone-lace [iron] drawn up into the air to the not-contemptible height of four hundred and eighty-seven feet. In the same city also the scarcely-less noble monument, the venerable Church of St. Ouen received, a few years since, its beautiful and tasteful façade, and stands now, in every part, one of the most perfect specimens of Gothic architecture in existence. The same spirit in England has made, or is making, its mark on many a grand old thirteenth-century cathedral. This very year, and in the early part of the month of May, Italy is to step to the front and exhibit to the world a long-deformed structure — in spite of its deformity one of the grandest and most beautiful in Europe — completed.

The cathedral at Florence, so long wanting in that essential feature a face, has, within the last few years, been acquiring one which is to be unveiled to the public on the 12th of May. Travellers in Italy some twelve or fifteen years ago were often pained, in making the circuit of this almost incomparably majestic and beautiful pile of many-colored marbles, to find, at the very next step after passing the tower of Giotto and immediately confronting the simple and majestic baptistery, a grim, rough wall and nothing more! "Why is this?" has been the query of thousands of travellers. When the cathedral was begun, with Arnolfo, son of Cambio, as architect (who laid the foundation-stone in 1294 and continued the work until his death, in 1310), the façade grew with the rest and in the same character as the lateral exteriors, that is, faced with colored marbles; but for the sake of harmony and repose, and perhaps in order to leave the climax for the dome, it was not ornamented in any way superior to the other parts of the exterior. After Arnolfo's death, work was entirely suspended for many years, until finally, in 1334, Giotto, who, about this time, had become the successful competitor for the bell-tower, and had laid the foundation-stone of his tower, was chosen architect, and work was resumed. Giotto, however, never saw erected more than a few metres of the base of the beautiful tower which bears his name — to say nothing of the cathedral — as he died two years after its commencement, but it was finished after his model. The architects who succeeded him, and the building authorities, on comparing the tower with the sober face of the cathedral, decided to change Arnolfo's plan, and accordingly proceeded to build outside of his front another that corresponded with the tower. This façade, as described by the historian and architect Rondinelli (1600), and by others, was very beautiful, a statement which, with the tower before one's eyes, it is not difficult to believe. About one-third of this face only was completed. Rondinelli says it was full of beautiful niches for statuary, upon which the most celebrated sculptors of the time, Donatello and others, had already been at work. There were numerous chapels (recesses), divided and supported by variegated columns, some smooth, some twisted, so that with all this variety of form and color the whole was rich and majestic in the extreme. For what reason the work never proceeded farther is uncertain. It is conjectured that the wall was thought to be too weak to support the heavy ornamentation. Work seems to have been suspended early in the fifteenth century. In this unfinished state the façade stood for about two hundred years the admiration of artists and travellers in Italy.

In the year 1588 the Grand Duke Francesco (Medici), who wished to imitate his father, Cosmo, in doing great things for Florence, called for models for a new façade, and meanwhile to clear the way for it, he set the Architect Buontalenti to tearing down the Giottesque façade, which was no longer considered to be in harmony with the rest of the cathedral, which, by the addition in the fifteenth century of the dome of Brunelleschi, had assumed a new and severe majesty. The description of Rondinelli of the tearing down of this front is touching. Buontalenti called together a number of master-workmen and offered the work of demolition to the one who would do it for the least money. The sacriligious job was finally awarded for the sum of 225 scudi, a scudo being five francs. The deed was done in a most ruthless manner. Except the statues, everything was knocked to pieces, even the beautiful columns and carved marbles, so that the people, it is said, looked sorrowfully on. For some cause the zeal for a new façade died out, however, before a commencement could be made. The chief source of difficulty is said to have been in the number and variety of models furnished. Nothing suitable could be chosen. Some of these models have been preserved, and may still be seen at the Warden's rooms. Forty years later, in 1628, another attempt was made, but it likewise failed.

This ends the history of the marble fronts previous to the one to be unveiled early in May. Not so, however, with the painted ones, of which the structure has had no less than four. The first was put up about 1515 for the reception of Pope Leo X in Florence, in preparation for which event Andrea del Sarto was ordered to paint a façade on wood which was to be set up over the incomplete one of Giotto. This he did, with the help of Sansovino and other artists, according to Vasari, and with great skill, painting in light and shade pillars, bas-reliefs, and statues one story above another. The Pope praised it, and there was talk of its being carried out in marble, but with the departure of the Pope this zeal also departed. Nothing further was done. The second temporary façade was a linen one (1589) set up one year after the destruction of the Giottesque one of marble. The occasion was the marriage of the Grand Prince Ferdinand I. It was afterward used for decorating the doors of the interior, where it remained until 1847. The third painted façade (1661) was also of linen. It was made for the marriage of the Grand Prince Cosmo with the Bourbon Princess Louise, daughter of the Duke of Orleans. The painter of this (probably Rondinelli), in order to flatter the French Princess, made a series of pictures in which her countrymen figured, including scenes from the life of St. Clotilde, St. Louise of Cluis, and Charlemagne. Fortunately, not long after it had done service at the wedding, this façade was torn to pieces and blown away by a wind tempest. The fourth and last of the painted façades was also made for a royal wedding, that of Cosmo III's son Ferdinand, in 1688. This time the wall itself was painted on, the ragged surface having been covered with a suitable coat of plaster for the purpose. Upon this were painted in fresco over the central and each of the lateral portals, immense pictures representing the three great Papal councils held at different periods in the cathedral. The coat of plaster remained intact until 1870, when its destruction was begun as the initiatory step for the façade now completed. The rain had carried away the last vestige of the pictures long before.

So much for the history of past façades. About fifty years since, after one hundred and fifty years of entire silence, the architect Metas, who had just succeeded in constructing a very handsome façade for the church of the Santa Croce, aroused fresh interest in the subject of a new one for the cathedral. It was firmly resolved to proceed in the matter, and a corner-stone was laid in May, 1860, under the auspices of Victor Emmanuel, who had just then become King of Italy. The next day his treasurer was authorized to subscribe 100,000 francs as the gift of the King from his private funds. It was seven years, however, in spite of the almost constant study of more than two score of architects, before a plan was chosen, and Emilio de Fabris, then professor of architecture in the Academy of Fine Arts in Florence, was appointed architect. Of the nine styles of models which, at various times, had been sent in by competitors, two styles alone admitted of consideration — the Basilical and the Gothic — the question of the two hinging particularly on the crowning of the front. If the cathedral at its conception and birth was Gothic it was because at that time any other style of temple for religious worship could scarcely have found an architect in Europe. Something was needed which combined severe grandeur with genial loveliness, a style, in short, in which the dome of Brunelleschi and the tower of Giotto should find each an echo. What was chosen at last was a thoroughly Gothic plan from foundation to pinnacle, very rich in ornamentation, but with much dignity in treatment.

The appointment of de Fabris as architect was the beginning of a seven or eight years' architectural war that divided Florence into factions quite as noisy, if not as bloody, as the Bianchi and Neri, or the Guelphi and Ghibellini of old. In 1873 de Fabris, who, during the six years since his appointment, had been hard at work making preparations, and had made no reply to any attack, finally broke silence, and in a published letter to the deputation said one would suppose by the articles in the journals that the end of the world would come if the Ministry and all others in authority did not come together *in massa* and prevent the tearful misfortune of seeing the tricusped system crown the future façade of Santa Maria del Fiore. Then, by drawings, he illustrated the consistency of his plan.

In 1870 a commencement was made by the removal of the coating upon which the 1688 frescos had been painted, thus laying bare the wall for the application of marble, and finally, in December, 1875, the scaffoldings and screens were erected, and the work was actually under way. In 1879 the left side, about one-quarter of the whole front, being completed, except the crowning-point, was uncovered and universally applauded. After this the work went on pretty smoothly until 1883, when the death of the architect, de Fabris in

June, effected another change in the history of the façade. The whole being by this time finished up to the same line as the part which had been exhibited, it was decided to finish the top in wood, painted to imitate the marbles, one-half in the basilical and the other in the tricusped style, and then to uncover the whole front with due solemnities. This plan, under the auspices of the architect del Moro, who had been appointed to succeed de Fabris, was carried out, and basilical or tricusped was now the great question. There was not a baker's boy or an apprentice sewing-girl in Florence who did not for the time feel that the whole weight of the façade question rested on him or her for solution, and "*basilicale o tricuspidale?*" was discussed by them over polenta or hard bread and salami, as though such architectural terms were something with which they had always lived on familiar footing. The people were quite unanimous in favor of the tricusped style, but the basilical, alas! finally triumphed, and in this style the work has been finished. In a few days we shall see what the effect of the whole is, and it will certainly be a fortunate circumstance if in the Gothic front of de Fabris there are no strong leading chords which do not find a perfectly happy solution in the crowning basilical work of del Moro.

The festivities on this occasion are to be on the grandest scale. All Florence has been for weeks topsy-turvy in getting ready, and if ever she merited the name of "Firenze la bella" it will be when, with all her streets (which needed it) newly-paved and everything resplendently clean, beflagged and beflowered, she is in full dress for the ceremonies. As for the cathedral, it the advice of the Circolo Artistico is carried out, it is to be wreathed in its whole vast perimeter to the height of ten feet with flowers! For is not its name Santa Maria del Fiore? and is not the name of the city Firenze? On the night after the uncovering of the façade every window in Florence is to be illuminated by municipal order, and colored transparencies of myriads of designs are already for sale. Those who are too poor to illuminate are to be supplied with materials by the municipality, so that not a window shall be left dark in the entire city. The festival is to last from the 4th to the 20th of May, inclusive. A grand international tournament, a grand historical ball, boat-races on the Arno, horse-races in the Cascine, grand processions of all kinds by day, and grand fireworks of all kinds by night — these are some of the features of the programme. — *New York Times.*

SAFE BUILDING.—XV.[1]

CHAPTER IV.

WALLS AND PIERS.

WALLS are usually built of brick or stone, which are sometimes, though rarely, laid up dry, but usually with mortar filling all the joints. The object of mortar is threefold:

Object of mortar.

1. To keep out wet and changes of temperature by filling all the crevices and joints.

2. To cement the whole into one mass, keeping the several parts from separating, and,

3. To form a sort of cushion, to distribute the crushing evenly, taking up any inequalities of the brick or stone, in their beds, which might fracture each other by bearing on one or two spots only.

To attain the first object, "grouting" is often resorted to. That is, the material is laid up with the joints only partly filled, and liquid mortar is poured on till it runs into and fills all the joints. Theoretically this is often condemned, as it is apt to lead to careless and dirty work and the overlooking of the filling of some parts; but *practically* it makes the best work and is to be recommended, except, of course, in freezing weather, when as little water as possible should be used.

To attain the second object, of cementing the whole into one mass, it is necessary that the mortar should adhere firmly to all parts, and this necessitates soaking thoroughly the bricks or stones, as otherwise they will absorb the dampness from the mortar, which will crumble to dust and fail to set for want of water. Then, too, the brick and stone need washing, as any dust on them is apt to keep the mortar from clinching to them. In winter, of course, all wetting must be avoided, and as the mortar will not set so quickly, a little lime is added, to keep it warm and prevent freezing.

Thickness of joints. To attain the third object, the mortar joint must be made thick enough to take up any inequalities of the brick or stone. It is, therefore, impossible to set any standard for joints, as the more irregular the beds of the brick or stone, the larger should be the joint. For general brickwork it will do to assume that the joints shall not average over one-quarter of an inch above irregularities. Specify, therefore, that, say, eight courses of brick laid up "in the wall" shall not exceed by more than two inches in height eight courses of brick laid up "dry." For front work it is usual to gauge the brick, to get them of exactly even width, and to lay them up with one-eighth inch joints, using, as a rule, "putty" mortar. While this makes the prettiest wall, it is the weakest, as the mortar has little strength, and the joint being so small it is impossible to bond the facing back, except every five or six courses in height. "Putty" mortar is made of lime, water and white lead, care being taken to avoid all sand or grit in the mortar or on the beds.

Quality of mortars. The best mortar consists of English Portland cement and sharp, clean, coarse sand. The less sand the stronger the mortar.

Sand for all mortars should be free from earth, salt, or other impurities. It should be carefully screened, and for very important work should be washed. The coarser and sharper the sand the better the cement will stick to it. English Portland cement will stand as much as three or four parts of sand. Next to English come the German Portland cements, which are nearly as good. Then the American Portland, and lastly the Rosendale and Virginia cements. Good qualities of Rosendale cements will stand as much as two-and-a-half of sand. Of limes, the French lime of Teil is the strongest and most expensive. Good, hard-burned lime makes a fairly good mortar. It should be thoroughly slacked, as otherwise, if it should absorb any dampness afterwards, it will begin to burn and swell again. At least forty-eight hours should be allowed the lime for slacking, and it is very desirable to strain it to avoid unslacked lumps. Lime will take more sand than cement, and can be mixed with from two to four of sand, much depending on the quality of the sand, and particularly on the "fatness" of the lime. It is better to use plenty of sand (with lime) rather than too little; it is a matter, however, for practical judgment and experiment, and while the specification should call for but two parts of sand to one of lime, the architect should feel at liberty to allow more sand if thought desirable. Lime and Rosendale cement are often mixed in equal proportions, and from three to five parts of sand added; that is, one of lime, one of cement, and three to five of sand. It is advisable to specify that all parts shall be actually measured in barrels, to avoid such tricks, for instance, as hiring a decrepit laborer to shovel cement or lime, while two or three of the strongest laborers are shovelling sand, it being called one of cement to two or three of sand. A little lime should be added, even to the very best mortars, in winter, to prevent their freezing.

Frozen walls. When a wall has been frozen, it should be taken down and re-built. Never build on ice, but use salt, if necessary, to thaw it; sweep off the salt-water, which is apt to rot the mortar, and then take off a few courses of brick before continuing the work. Protect walls from rain and frost in winter by using boards and tarpaulins. Some writers claim that it does no harm for a wall to freeze; this may be so, provided all parts freeze together and are kept frozen until set, and that they do not alternately freeze and thaw, which latter will undoubtedly rot the mortar.

Plaster-of-Paris makes a good mortar, but is expensive and cannot stand dampness. Cements or limes that will set under water are called hydraulic.

Quickness of setting is a very desirable point in cements. All cement-mortars, therefore, must be used perfectly fresh; any that has begun to set, or has frozen, should be condemned, though many contractors have a trick of cutting it up and using it over with fresh mortar. To keep dampness out of cellar-walls the outside should be plastered with a mortar of some good hydraulic cement, with not more than one part of cement to one part of sand; this cement should be scratched, roughened, and then the cement covered outside with a heavy coat of asphalt, put on hot and with the trowel. In brick walls, the coat of cement can be omitted and the joints raked out, the asphalt being applied directly against the brick. This asphalt should be made to form a tight joint, with the slate or asphalt damp-course, which is built through bottom of wall, to stop the rise of dampness from capillary attraction.

In ordinary rubble stonework the mortar should be as strong as possible, as this class of work depends entirely on the mortar for its strength.

For the strengths of different mortars, see Table V.

Some cements are apt to swell in setting, and should be avoided.

Smoke flues. Where flues or unplastered walls are built, the joints should be "*struck*," that is, scraped smooth with the trowel. No flues should be "pargetted"; that is, plastered over, as the smoke rots the mortar, particles fall, and the soot accumulating in the crevices is apt to set fire to the chimney. Joints of chimneys are liable to be eaten out from the same reason, and the loose portions fall or are scraped out when the flues are cleaned, leaving dangerous cracks for fire to escape through. It is best, therefore, to line up chimneys inside with burned earthenware or fire-clay pipes. If iron pipes are used, cast-iron is preferable; wrought-iron, unless very thick, will soon be eaten away. Where walls are to be plastered, the joints are left as rough as possible, to form a good clinch.

Wall furrings. Outside walls are not plastered directly on the inside, unless hollow; otherwise, the dampness would strike through and the plaster not only be constantly damp, but it would ultimately fall off. Outside walls, unless hollow, are always

[1] Continued from page 167, No. 588.

"furred." In fireproof work, from one to four-inch thick blocks are used for this purpose. These blocks are sometimes cast of ashes, lime, etc., but are a very poor lot and not very lasting. Generally they are made of burnt clay, fire-clay or porous terra-cotta. The latter is the best, as, besides the advantages of being lighter, warmer and more damp-proof, it can be cut, sawed, nailed into, etc., and holds a nail or screw as firmly as wood. These blocks are laid up independently of the wall, but occasionally anchored to the same by iron anchors. The plastering is applied directly to the blocks.

In cheaper and non-fireproof work, furrings are made of vertical strips of wood about two inches wide, and from one to two inches thick, according to the regularity of the backing. For very fine work, sometimes, an independent four-inch frame is built inside of the stone-wall, and only anchored to same occasionally by iron anchors. Where there are inside blinds, a three or four inch furring is used (or a fireproof furring), and this is built on the floor beams, as far inside of the wall as the shutter-boxes demand. To the wooden furrings the laths are nailed. Furrings are set, as a rule, sixteen inches apart, the lath being four feet long; this affords four nailings to each lath. Sometimes the furrings are set twelve inches apart, affording five nailings. All ceilings are cross-furred every twelve inches, on account of stiffness, and the strips should not be less than one-and-three-eighths inches thick, to afford strength for nailing. Furring-strips take up considerable of the strain of settlements and shrinkage, and prevent cracks in plastering by distributing the strain to several strips. To still further help this object, the "heading-joints" of lath should not all be on the same strip, but should be frequently broken (say, every foot or two), and should then be on some other strip. Laths should be separated sufficiently (about three-eighths inch) to allow the plaster to be well worked through the joint and get a strong grip or "clinch" on the back of the laths. If a building is properly built, theoretically correct in every respect, it should not show a single crack in plastering. Practically, however, this is impossible.

Shrinkage of joints. But there never need be any fear of shrinkage or settlement, in a well-constructed building, where the foundations, joints and timbers are properly proportioned. The danger is never from the *amount* of settlements or shrinkage, but from the *inequality* of same in different parts of the building. Inequalities in settlements are avoided by properly proportioning the foundations. Inequalities in shrinkage of the joints, though quite as important, are frequently overlooked by the careless architect. He will build in the same building one wall of brick with many joints, another of stones of all heights and with few joints, and then put iron columns in the centre, making no allowance whatever for the difference in shrinkage. If he makes any, it is probably to call for the most exact setting of the columns, for the hardest and quickest-setting Portland cement for the stonework, and probably be content with lime for the brickwork. To avoid uneven shrinkages, allowances should be made for same. Brickwork will shrink, according to its quality, from one-sixteenth to one-eighth inch per story, ten to twelve feet high, and according to the total height of wall. The higher the wall, the greater the weight on the joints and the greater the shrinkage. Iron columns should, therefore, be made a trifle shorter than the story requires, the beams being set out of level, lower at the column. The plan should provide for the top of lowest column to be one-sixteenth or one-eighth inch low, while the top of highest column would be as many times one-sixteenth or one-eighth inch low as there were stories; or if there were eight stories, the top of bottom column for the very best brickwork would be, say, one-sixteenth inch low, and the top of highest column would be one-half inch low. Stone walls should have stone backings in courses as high as front stones, if possible; if not, the backing should be set in the hardest and quickest-setting cement. Stone walls should be connected to brick walls by means of slip-joints. By this method the writer has built a city stone-front, some 150 feet high and over 50 feet wide, connected to brick walls at each side, without a single stone sill, or transom, or lintel cracking in the front. The slip-joint should carry through foundations and base courses where the pressure is not equal on all parts of the foundation. If for the sake of design, it is necessary to use long columns or pilasters, in connection with coursed stone backings, the columns or pilasters must either be strong enough to do the whole work of the wall, or else must be bedded in putty-mortar with generous top and bottom joints, to allow for shrinkage of the more frequent joints behind them; otherwise, they are apt to be shattered. Such unconstructional designs had, however, better be avoided. In no case should a wall be built of part iron uprights and part masonry; one or the other must be strong enough to do the work alone; no reliance could be placed on their acting together. In

Slip-joints.

Shrinkage of timber. frame walls, care should be taken to get the amount of "cross" timbering in inner and outer walls about equal, and to have as little of it as possible. Timber will shrink "*across*" the grain from one-fourth to one-half inch per foot. Where the outer walls are of masonry, and inner partitions or girders are of wood, great care must be taken that the shrinkage of each floor is taken up by itself. If the shrinkage of all beams and girders is transferred to the bottom, it makes a tremendous strain on the building and will ruin the plastering. To effect this, posts and columns should bear *directly* on each other, and the girders be attached to their sides or to brackets, but by no means should the girder run between the upper and lower posts or columns. If there are stud-partitions, the head pieces should be as thin as possible, and the studs to upper partitions should rest *directly* on the head of lower partitions.

All beds level. In masonry, all beds should be as nearly level as possible, to avoid unequal crushing. Particularly is this the case with cut stonework. If the front of the stone comes closer than the backing (which is foolishly done sometimes to make a small-looking joint), the face of the stone will surely split off. If the back of a joint is broken off carelessly, and small stones inserted in the back of a joint to form a support to larger stones, they will act as wedges, and the stone will crack up the centre of joint and wall. Stones should be bedded, therefore, perfectly level and solid, except the front of joint for about three-fourth inches back from the face, which should not be bedded solid, but with "putty"-mortar. Light-

Cement stains. colored stones, particularly lime-stones, are apt to stain if brought in connection with cement-mortar. A good treatment for such stones is to coat the back, sides and beds with lime-mortar, or, if this is not efficacious, with plaster-of-Paris.

Natural bed. All stones should be laid on their "natural beds"; that is, in the same position as taken from the quarry. This will bring the layers of each stone into horizontal positions, on top of each other, and avoid the "peeling" so frequently seen. Ashlar should be well anchored to the backing. The joints should be filled with putty-mortar, and should be sufficiently large to take up

Size of stones. the shrinkage of the backing. Stones should not be so large as to risk the danger of their being improperly bedded and so breaking. Professor Rankine recommends for soft stones, such as sand and lime stones, which will crush with less than 5000 pounds' pressure per square inch, that the length shall not exceed three times the depth, nor the breadth one-and-a-half times the depth. For hard stones, which will resist 5000 pounds' compression per square inch, he allows the length to be from four to five times the depth, and the breadth three times the depth. Stones are sometimes joined with "rebated" joints, or "dove-tail" joints, the latter particularly in circular work, such as domes or light-houses.

Sills bedded hollow. All sills in either stone or brick walls should be bedded at the ends only, and the centre part left hollow until the walls are thoroughly set and settled; otherwise, as the piers go down, the part between them, not being so much weighted, will refuse to set or settle equally with them, and will force up the centre of sill and break it. Where there are lintels across openings in one piece, with central mullion, the lintel should either be jointed on the mullion, or else the mullion bedded in putty at the top. Otherwise, the lintel will break; or, if it be very strong, the mullion will split; for, as the piers set or settle, the lintel tends to go down with them, and, meeting the mullion, must either force it down, or else break it, or break itself.

Slip-joints. Walls of uneven height, even where of the same material, should be connected to each other by means of a slip-joint, so as to provide for the uneven shrinkage. Slip-joints must be so designed that while they allow independent vertical movement to each part, neither can separate from the other in any other direction. Figures 71 to 73 give a few examples.

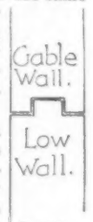


Fig. 71.

Figure 71 shows the plan of a gable-wall connected with a lower wall, by means of a slip-joint. Figure 72 shows the corner of a front stonewall connected similarly with side-wall of brick. Figure 73 the corner of a tower or chimney connected with a lower wall. The joint must be built plumb from top to bottom. Where the higher wall sets over the tongue above lower wall, one or two inches must be left hollow over the tongue, to allow for settlement or shrinkage of the higher wall and to prevent its resting on the tongue and possibly cracking it off. Where iron anchors are used in connection with slip-joints, they should be so arranged as to allow free vertical movement.

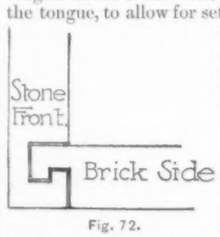


Fig. 72.

Such joints and anchors must be designed with reference to each special case. In stepped-foundations (on shelving-rock, etc.), or in walls of uneven heights where slip-joints are impracticable, the foundations or walls should be built up to each successive level and be allowed to set thoroughly before building further. A hard and quick-setting cement should be used, and the joints made as small as possible. In no case should one wall of a building be carried up much higher than the others, where slip-joints are not to be used. When building on top of old work, clean same off thoroughly or the mortar will not take hold (clinch). In summer, soak the old work thoroughly.

Old and new walls. Where new work has to be built against old work, a slip-joint should be used, if possible, or else a straight joint should be used with slip-anchors, and after the new work has thoroughly set, bond-stones can be cut in. In such cases, the foundations should be spread as much as possible, to avoid serious settlements. In all work involving old and new walls combined, the quickest and hardest-setting cements should be used. Sometimes it is advisable not to load walls until they have set, unless all walls are loaded alike, as the uneven weights on green walls are apt to crack them. All walls should be well braced, and wooden centres left in till they have set thoroughly.

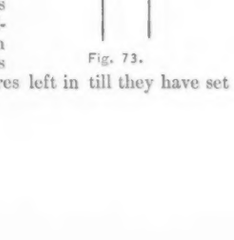


Fig. 73.

Timber in walls. Timber of any kind, in walls, should be avoided, if possible.

It should only be used for temporary support, as it is liable to rot, shrink, burn out, or to absorb dampness and swell, in either case causing settlements and cracks, even if not endangering the wall. In no case bond a wall with timbers. Where it is necessary to nail into a wall, wooden plugs are sometimes driven into the joints; they are very bad, however, and liable to shake the wall in driving. Wooden strips, let in, weaken the wall just that much. Wooden nailing-blocks, though not much better, are frequently used. The block should be the full thickness of the bricks, plus the upper and lower joints. If there is any mortar over or under the block, the nailing will jar it loose and the block fall out. The best arrangement to secure nailings is to build-in porous terra-cotta blocks or bricks.

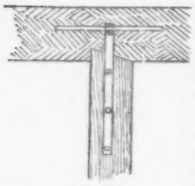


Fig. 74.

Beam ends. Where ends of beams are built into the wall, they should always be cut off to a slant, as shown in Figure 74.

The anchors should be attached to the side, so as to allow the beam to fall out in case it is burned through. If the beams were not cut to a slant, the leverage produced by their weight, when burned through, would be apt to throw the wall; as it is, each beam can fall out easily and the wall, being corbelled over the beam-opening, remains standing. It is desirable to "build-in" the ends of wooden beams as little as possible, to prevent dry-rot; if it can be arranged to circulate air around their ends, it will help preserve them. Beams should always be levelled-up with good-sized pieces of slate, and not with wood-chips, which are liable to crush. The old-fashioned way of corbelling out to receive beams, leaving the wall intact, has much to commend it. A modern practice is to corbel out one course of brick, at each ceiling-level, just sufficient to take the projection of furring-strips; this will stop draughts in case of fire, also rats and mice from ascending. All slots for pipes, etc., should be bricked up solid around the pipes for about one foot at each ceiling-level for the same purposes.

Wooden lintels. Where wooden lintels are used in walls, there should always be a relieving-arch over them, so arranged that it would stand, even if the lintel were burned out or removed; the lintel should have as little bearing as possible, and be shaved off at the ends.

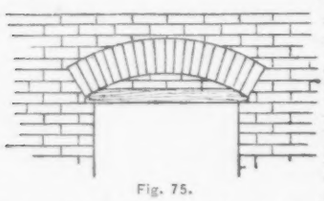


Fig. 75.

Figure 75 shows a wooden lintel correctly built-in. Figure 76 shows a very blundering way of building-in a wooden lintel, but one, nevertheless, frequently met with. It is obvious, however, in the latter case, that if the lintel were removed the abutment to the arch would sink and let the arch down. The relieving-arch, after it has set, should be strong enough to carry the wall, the lintel being then used for nailing only. The rule for lintels is to make their depth about one-tenth of the span.

Bonded arches best. Arches are built of "row-locks" (that is, "headers,") or of "stretchers," or a combination of both, according to design. The strongest arch, however, is one which has a combination of both headers and stretchers; that is, one which is bonded on the face, and also bonded into the backing. Straight arches and arches built in circular walls should always be bonded into the backing, or if the design does not allow of this, they should be anchored back. "Straight" arches should be built with a slight "camber" up towards the centre, to allow for settlement and to satisfy the eye. About one-eighth inch rise at the centre for each foot of span is sufficient. Straight arches should never be built, as shown in Figure 77, and known as the French or Dutch arch, as there is absolutely no strength to them. Fireplaces are frequently arched over in this way, but the practice is a very bad one.

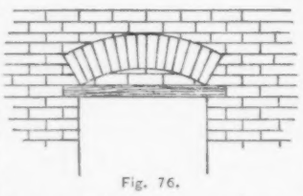


Fig. 76.

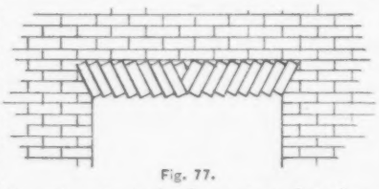


Fig. 77.

Louis DeCoppet Berg.

[To be continued.]

The Statue of Rameses II.—The *Athenæum* wants the fallen statue of Rameses II floated off the banks of the Nile at high water, and towed to Malta, where "any 100-ton gun-ship could bring it to London." It was once presented to England. It is agreed that to re-erect it would expose it to vandalism, and to place it at the Boulaq Museum would insure its destruction by damp. (!)

UNITED STATES GOVERNMENT BUILDING PRACTICE.[1]—IV.

FOUNDATIONS.

THE foundation for a wall is the spreading out of a wall, or the base of masonry or other material, widened so that the weight of the wall will be distributed over a greater area than if the wall rested immediately on the ground.

In preparing the drawing for foundations, the first thing to consider is how much, if any, additional width to the wall is required; in determining this, it is necessary to obtain the weight of the wall and the weight it will have to carry, and opposed to the above the weight the soil will bear safely.

To obtain the weight of the wall, the actual number of cubic feet in the wall per lineal foot is multiplied by one hundred and twelve pounds, the weight of a cubic foot of brickwork; this will give the weight per lineal foot of wall; if the wall is faced with stone, the number of cubic feet of stone in a lineal foot of the wall must be multiplied by the weight of the stone (which varies from 150 pounds per cubic foot for sandstone, to 165 and 170 pounds for limestone, marble and granite); this, added to the weight of the brickwork, will give the weight per lineal foot of wall.

The walls must carry the weight of the floors, ceilings, girders, roofs, trusses, etc.

The average weight on the floors is estimated at one hundred pounds per square foot, and the weight of the floor itself at twenty-five pounds per square foot, making a total of one hundred and twenty-five pounds for each floor. A ceiling is estimated at about one-third or one-half of the total weight of the floor. All floor and ceiling beams will transfer the weight of the floor on one-half of their span multiplied by the distance apart of beams, on centres, to the walls on which they rest. Where girders and trimmers occur, their weights and the weights they carry must be specially estimated.

The average weight estimated for deck-roofs is fifty pounds per square foot, and for pitch-roofs from sixty to seventy pounds per square foot of horizontal area; this includes the weight of the roof itself, snow and wind-pressure. Where trusses are required, one-half of the total weight of the truss and the weight it carries, is transferred to the wall at each end, and must be especially estimated,

The total weight of the wall and all the weight bearing on it, floors, roof, trusses, etc., will give the weight per lineal foot to be sustained by the foundation.

The entire weight resting on piers must be estimated in the same general manner for all walls, girders, floors, roofs, etc., resting on them.

The above weights are only used as general averages in calculating for foundations, the actual floor and roof construction must be calculated much more accurately and carefully.

To sustain the loads as above calculated, an ordinarily good soil is estimated to bear safely two and one-half tons per square foot, and a prairie or bottom soil from one to one and one-half tons per square foot.

Foundations are almost always made of concrete, but sometimes of brick or stone; they project not more than eighteen inches beyond the face of the wall on each side. When a greater projection may be necessary in order to obtain the requisite bearing-surface, it is generally deemed advisable to use piles for strengthening the foundation soil, and not more than six tons is assumed as the safe load on each pile; of course the weight the soil will sustain is considered in estimating the loads on the piles. On top of the piles or timber capping, a concrete foundation is placed, which usually projects about one foot on each side of wall, and has a depth of from eighteen inches to two feet.

Where piling is not required, after the width of the foundation has been determined so as to distribute the weight according to the capacity of the soil, the depth of the foundation is obtained as follows: Let A–C be the width of the concrete and top line of foundation; from B, the intersection of face of wall with foundation, draw

[1] Continued from page 163, No. 588.

B–D, forming an angle of sixty degrees with A–C; where this line intersects perpendicular from A at D will be the required depth of foundation.

It has been the custom until recently to take the safe angle of fracture (A B D in Fig. 1) at not less than forty-five degrees, and no defects nor unsatisfactory results have been observed in any foundations thus constructed, but as it is the endeavor of the Government to construct its buildings upon an absolutely safe basis; so as to create no reasonable doubt of safety, it has been thought best by the Civil Engineer to increase this angle to sixty degrees.

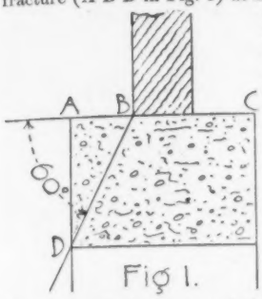


Fig 1.

The principle of equalizing the weights so that there will be the same pressure per square foot for all the foundations, is undoubtedly the safest plan to adopt on very bad soils, but the sites for Government buildings have generally been so good that this has not been considered. This principle, though the best is not absolutely reliable, as the soil at one end of a large building may safely bear two and one-half tons, while at the other end it may be insufficient for one ton of pressure. To guard against this, it is generally thought best to make the concrete mass so thick as to run no risk of cracking under a heavy unequal pressure.

Solid-Rock Foundation. — Solid-rock foundation has seldom been met with in Government building. For the building at Nashville, Tenn., it was necessary to make excavation in the rock to get basement room, and the walls were started from the rock. For the building now being erected at Rochester, N. Y., the trenches were excavated to solid rock and concrete used to fill in all the irregularities of the rock-bed and bring the foundations up to one level.

Brick Foundations. — Brick foundations are seldom used, except for dwarf walls for steps and areas, or for small partition-walls having little weight on them; a bed of cement mortar one or two inches thick is levelled up for the wall and the footings formed by offsetting each course one-and-one-half or two inches beyond the face of the course above, with a double course at bottom, as shown in Figure 2.

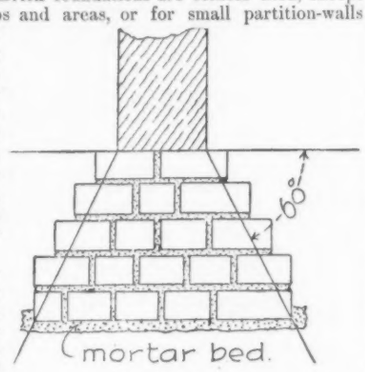


Fig 2.

Stone Foundations. — Where stone foundations are used, the stones are bedded on a level base of concrete from six to twelve inches deep, and the courses of stone foundations made not less than six inches in height; the stones should be through-stones extending through the entire width of the course in one piece; the weights which the stone footings will carry may be estimated as though the stone were an inverted beam supported in the centre, and loaded uniformly throughout its entire length.

Where the stones are not through-stones, but have joints in their widths, the angle of fracture may be taken at forty-five degrees or even less, depending upon the thickness and jointing (see Fig. 3). The beds, builds and joints to be dressed to a smooth, even, regular surface, with no holes or cavities, so that a uniform bearing may be secured over the entire bearing surface; it is unnecessary to dress the ends of stones or the tops where they do not come in contact with the upper foundation-stones or brickwork.

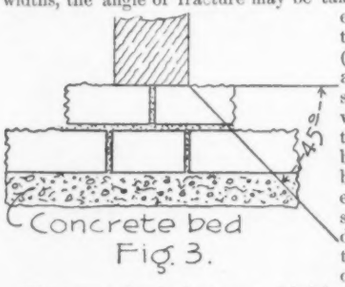


Fig. 3.

The mortar for both stone and brick foundations to be composed of good hydraulic cement and clean sharp sand in the proportions of two (2) parts of sand to one (1) part of cement measured dry.

Brick and stone foundations are measured the same as ordinary brick and stone work; the brick is estimated at a rate per M. and the stone at a rate per cubic foot; this will be thoroughly explained under the headings of brick and stone work respectively.

Concrete Foundations. — As before stated, foundations for Government buildings are almost invariably made of concrete. The materials are generally purchased under advertisement and the mixing and laying performed by days' labor under the direction of the superintendent of construction. The concrete is composed of cement, sand, and broken stone.

The bids for each kind of material are to be made at a rate per unit of quantity, and are considered separately. The quantities given in the specification are estimated; the right to purchase more or less of the materials at the quoted rates is reserved.

Cement. — The cement is to be delivered in barrels of three hundred pounds each, to be American cement freshly ground and equal in quality to the United States Government brand, manufactured by the Standard Cement Co., of Hartford, Conn. The above standard has not been long established, and is not rigidly used in all cases, as several other cements are cheaper and good enough for the purposes required. The following cements, with the given average tensile strength per square inch after immersion six days in water, have been used in the past year:

AVERAGE TENSILE STRENGTH PER SQUARE INCH.

Milwaukee cement, 45 pounds.	Rosendale cement, 53 pounds.
Newark " 40 "	James River, Va., cement, 75 pounds.
Buffalo and Akron, O., cement, 54 lbs.	U. S. G. brand, Hartford, 8 days immersion, 230 pounds; 1 day immersion, 105 pounds.
Star and Black Diamond, Louisville, 116 pounds.	

The more finely-ground cements, when mixed with sand, will stand a higher test than the coarsely ground, but the coarser cements stand the higher tests when pure and without sand.

Sand. — The sand to be sharp, clean, and free from all clay, earthy, vegetable or other foreign substance.

Broken Stone. — The stones to be hard, durable, clean and broken to a size that will pass through a two-inch diameter ring, and be in quality, shape and size suitable for concrete. Pebbles or smooth stones are seldom used, as the cement more strongly adheres to the rough or broken stones.

Mixing. — The concrete to be composed of five (5) parts of broken stone, one and one half (1½) parts of sand, and one (1) part of cement measured dry. Only the requisite quantity of water to be used (about twenty-three gallons to the cubic yard of concrete), and the whole to be thoroughly incorporated when prepared for the trenches.

Only so much mortar should be worked up at a time as can be put in the trenches and rammed solid in position, complete before the setting has taken place. The cement and sand must be well and thoroughly mixed dry, then water added and worked in until the whole is reduced to mortar of a uniform consistency. The broken stone, well drenched and drained, is then to be thrown into the boxes containing the freshly-made mortar, and worked into it until each stone is thoroughly coated with mortar, care to be taken that no more mortar is used than is necessary to fill the interstices between the stones.

Laying. — The concrete foundation is to be of the dimensions shown and noted on the drawing, of the various widths and depths figured and shown by sections, and must be carefully laid to the lines shown on the plan.

The concrete is to be mixed in small batches, and, immediately after mixing, to be put into the trenches in layers about nine inches thick, commencing and working both ways, and thoroughly but gently ramming until the water forms on the surface; this packing is to bed the broken stones firmly in contact with one another. Care should be taken that all joining of the concrete be made in the most judicious manner, the layers breaking joint. The first layer, after setting, is to be brushed and wet before the upper layer is put in, and the surface of the top layer to be finished with a skim-coat of mortar without stone, made level and even, ready to receive the masonry.

The concrete must not be thrown into the trenches from a height, as is commonly recommended, because this has a tendency to disarrange the mixing, making the stones and heavy pieces go to the bottom, but must be deposited in the trenches as carefully as practicable, so that the entire mass after deposit is thoroughly and uniformly mixed. The entire concrete foundations when completed, must be a thoroughly consolidated mass, without crack or flaw.

The opening for the passage of the drain-pipes under the walls of the building is to be formed while the concrete is being laid. For this purpose a glazed earthenware pipe, amply large for the passage of pipes, is put down, extending through the entire width of concrete, which is to be thoroughly packed around and over the top of the pipe.

Furnishing and Laying Concrete. — Where bids are received for furnishing materials and laying the concrete foundations complete, the rate per cubic yard must be stated in the proposal, at which rate payment will be made for any additional concrete that may be required. If necessary, the contractor must furnish the necessary materials, and form the trenches with plank sheeting, and after the concrete is set, must fill in with earth, and pack solid to line of top of concrete.

Measurement. — Concrete foundations are estimated by the cubic yard. The actual net cubic contents to be measured, but no deduction is made for passage of pipes; each different width and depth to be measured separately, and not in the aggregate by taking an average depth. The constants used for estimating the quantities of materials and the cost per cubic yard of concrete are:

Broken stone, 5 parts = 1 cubic yard.
Sand, 1¼ parts = .33 cubic yards.
Cement, 1 part = 1.4 barrels.
Water = 23 gallons.
Labor = .375 × mason's wages per day.

By actual experiment, it is found that two-inch broken stones gently rammed, contain forty per cent of voids. This can be tested by filling a water-tight box with stones, first drenched and drained, then pouring in water, and afterwards measuring the water. This

forty per cent of voids must be filled with sand and cement, and some excess must be allowed for the absorption of cement by the stone, which will be more or less according to the porosity of the stone, and on this account a porous stone may be better for some purposes (as the cement will take a better hold of it) than a harder one, provided it has the necessary crushing strength. The constants given were adopted after careful experiments and calculations, and are believed to be the best for almost all purposes.

To estimate the cost of a cubic yard of concrete by the above constants, add to the cost of one cubic yard of broken stone the cost of thirty-three per cent (.33) of a cube yard of sand, one and four-tenths (1.4) barrels of cement, and thirty-seven and one-half per cent (.375) of mason's wages per day; water is usually considered free, and need not be considered unless it costs the contractor something to furnish it.

Cost.— The cost of cement can usually be obtained from the quoted market rates, which, of course, vary in different localities. The cheapest cement ever used by the Government was the Syracuse cement at forty-nine and one-half cents per barrel; the average cost of the other cements was from one dollar to one dollar and a quarter, except the Louisville and United States Government cements, which cost from one dollar and ninety-five cents to two dollars and ten cents per barrel. The cost of sand varies a good deal: the prices paid for it per cubic yard in the last few years were, at

Des Moines, Ia.	$ .40	Terre Haute, Ind.	$ .55
Pensacola, Fla.	.80	Syracuse, N. Y.	.98
Pittsburgh, Pa.	1.00	Columbus, O.	1.49
Galveston, Tex.	1.60	Quincy, Ill.	.80
Richmond, Va.	.95	Aberdeen, Miss.	1.00
New Albany, Ind.	1.20		

The cost of broken stone per cube yard varies greatly, as follows:

Frankfort, Ky.	$ .94	Minneapolis, Minn.	$1.95
Detroit, Mich.	2.85	Syracuse, N. Y.	1.68
Pensacola, Fla.	5.00	New Albany, Ind.	1.82½
Galveston, Tex	3.50	Aberdeen, Miss	5.00

The cost per cubic yard for concrete materials furnished and laid complete was as follows:

Minneapolis, Minn.	$6.00	Hannibal, Mo.	$3.50
Brooklyn, N. Y.	6.50	Fort Wayne, Ind.	6.50
Pittsburgh, Pa.	4.95	St. Joseph, Mo.	4.00
Louisville, Ky.	3.50	Erie, Pa.	6.54
Leavenworth, Kan.	2.75	Rochester, N. Y.	4.00

Jas. E. Blackwell.

[To be continued.]

COMMUNICATIONS.

CINCINNATI'S CENTENNIAL EXHIBITION.

Cincinnati, O., April 20, 1887.

To the Editors of the American Architect:—

Dear Sirs,— The Exposition Commissioners have invited seven architects to submit sketches in design for the temporary buildings for the use of the Centennial Exposition of 1888. The main building will be erected in Washington Park, and will cover an area of about 75,000 square feet. The other building will be over the canal and will be about 1,300 feet long, and average 300 feet wide; the idea of the commissioners is that of something artistic, but, at the same time, of a temporary character. Each invited architect is to be paid for his design, and the successful architect will be employed with the usual architectural powers.

The new building law has just gone into effect here, and Mr. Walter R. Forbush has been appointed by Mayor Smith as building inspector. He will have an office in the city building, will have three assistants, and his salary is put at $2,500.

Cincinnati is at last to have a new City Hall, to cost about $600,000. It will be built on property now owned by the city, fronting on Plum, Eighth and Ninth Streets, and in front of the present old buildings. The commissioners appointed by the Governor are James M. Glenn, Thos. B. Paxton and Wm. B. Smith. C.

WRITTEN WORDS MORE PRECISE THAN NUMERALS.

Cleveland, O., April 26, 1887.

To the Editors of the American Architect:—

Dear Sirs,— Is there any rule governing competitions for work among contractors?

What would be the proper course to pursue with reference to a bid received where in writing it signifies a certain amount and in figures an amount one hundred dollars in excess; also, when the largest amount specified in bid is still the lowest bid received?

Please answer, and oblige one who seeks to do justice to all parties concerned. Yours truly, X.

[The written one is generally considered by the courts to be the one which should be taken, in preference to one expressed in figures. — Eds. American Architect.]

BLUE-PRINT SPECIFICATIONS.

Lansing, Mich., April 30, 1887.

To the Editors of the American Architect:—

Dear Sirs,— Enclosed please find a sheet of specifications copied by the "blue process." The original was written with Higgins's liquid India ink on Keuffel & Esser's parchment tracing-paper. Eight sheets may be printed at one exposure in a 24 x 36 inch frame. I find it both convenient and profitable. Perhaps this method of reproducing specifications has not been tried by architects who write their specifications; and while it would not meet with the approval of these who are able to dictate to short-hand writers and have specifications printed, it might prove of value to those who are less fortunate. If you think it desirable, mention of the same in your valuable journal would be appreciated. Yours very truly,

Wm. P. Appleyard.

TRADE SURVEYS.

Industrial and trade conditions throughout the country continue favorable. Manufacturers, with scarcely an exception, are as busy now as at any time since the opening of the year. In several industries, preparations are being made for a temporary decrease in output, while in others, the production will be increased, because of the demand which is growing for future requirements. The textile manufacturers are preparing to slightly check the output, and the iron and steel makers are running to full capacity to meet orders on hand — and to accumulate a little stock if possible.

The hardware interests are crowded with orders for builders' hardware, and for all standard and special lines of goods. The margins for hardware are said to be somewhat better.

Building material of all kinds is very active. The brick-makers in all sections of the country are sold up for the season. The makers of brick-machinery are quite busy on orders, which fact indicates that it is the intention of brick-makers to extend their capacity for 1888.

The boom in real estate through the South and West, and which has extended partially throughout the East, has been accepted as a safe indication to manufacturers of all kinds of material and products that it is safe to increase their capacity and to accumulate stocks as soon as it is found in their power to do so. These are some of the favorable indications at the present writing. A few of the unfavorable ones, if they may be so termed, are, the possibly deficient supply of currency to transact the business of the country, these features having been mentioned within a few days. The securities of twelve companies which have recently listed their stock on the New York Exchange amount to $100,000,000. Then again, an incalculable sum (so it is put), has been devoted to speculative purposes in all parts of the country; next, an enormous amount of capital — roughly estimated at from two to three hundred million dollars — is being flung into railway enterprises. Following this is the immense amount of money being invested in building operations of all kinds, large and small; besides, money is finding investment in a number of channels which it is impossible to define or enumerate; but the result is, that an enormous volume of capital is being diverted into reproductive channels. At this, a great many writers and supposed thinkers hold up their hands and cry, Halt! and predict omniously that disastrous consequences will follow to the railroad, manufacturing, and general industrial interests. But this is to be questioned. The United States is a phenomenal country, and we are now having a phenomenal experience. The requirements of the country are expanding rapidly, and our producing-capacity is as certainly keeping pace. There is, as yet, no over-production, and it is a question whether legitimate over-production is possible. Railroad building, thus far, has been wise and safe, unless we except a little unwise paralleling of roads in the Northwest. It is predicted by shrewd railroad-managers that there will be a recurrence in the Northwest of the experience which railroad builders had ten to twenty years ago, on this side of the Mississippi River, and notably on the roads running from New York to Chicago. Be this as it may, a break-down in the earning power of the railroads of the Northwest, will be but a small matter as compared to the general interests of the country at large.

The architects are everywhere busy. Our reports for the past week or ten days show an improving tone. An immense amount of new work has been recently undertaken consisting largely of bank, warehouse, railroad, and manufacturing work. A great deal of new work is being undertaken in the West and Northwest. That region is offering special inducements to architectural and engineering talent, and more or less of it is drifting in that direction and finding a welcome and remunerative employment. Railroad building throughout that region is not likely to be arrested, as the work is being done for future rather than present requirements.

Everything is prosperous at Chicago. The wholesalers are busy. Manufacturing interests are well supplied with orders, and all the smaller manufacturing towns throughout Illinois, Iowa, Missouri, and throughout the Southwest are reporting increased activity. Missouri is gaining in building activity, and the growing railroad and mining requirements of the Southwest promise to stimulate business operations in that State.

The returns from interior towns of from 5,000 to 20,000 population, especially in the Ohio and Mississippi Valleys, show that house and shop building will be very heavy all through the season. Private capital is seizing opportunities for safe investments. Lumber from the Northwest has been exhibiting some evidences of weakness in two or three Atlantic markets, but it is likely due to the anxiety of Eastern dealers to realize. The fears are expressed that after all the supply of building lumber will be such as to depress prices. Shipments of white pine have fallen off. Eastern distribution is only moderate, taking all markets into account. Yellow pine receipts are not beyond actual demands. There is particular activity in the hardwoods, and manufacturers are taking the hint to hasten on supplies. Freight-rate adjustments are gradually restoring confidence among the short-haul railroad patrons. The managers of mills and factories in some localities have suspended work and have placed the blame on lost business through inequitable rates. The industrial managers have no well-defined convictions as to the future course of trade. Some pretend to recognize the necessity of greater conservatism, but conservation is a mere sentiment when customers are writing and telegraphing and telephoning for the promptest execution of orders. The rush for material, merchandise, and products of labor of every description is altogether legitimate, and under wise control this phenomenal activity can be prolonged.

The American Architect and Building News

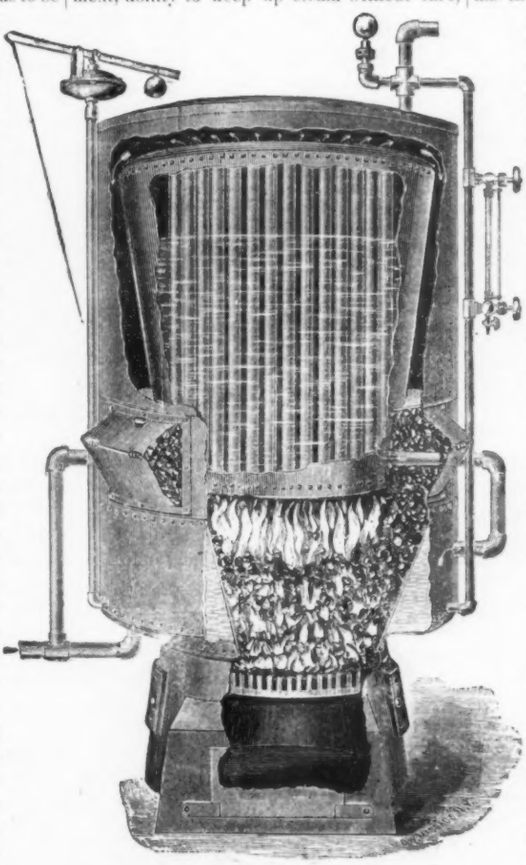
ADVERTISERS' TRADE SUPPLEMENT.

No. 59. SATURDAY, MAY 7, 1887. VOLUME XXI. No. 593.

HOUSE-HEATING BY STEAM.

STEAM is rapidly becoming more generally adopted as a means of warming dwellings and other buildings requiring a uniform temperature. In proportion as the fact asserts itself to the enterprising builder, landlord and tenant, that stoves and ranges, with their dirt, dust and constant care, are antiquated, contrasted with the rapid improvements made in other lines of household furniture, so also the demand increases for new improvements. As such improvements are being constantly made in every line of manufactured goods, it was to be expected that the old style of surface-burning hot-air furnaces, now used in the heating of houses would ere long give way to a more economical and improved style of steam-heating apparatus. It has been demonstrated that surface-burning boilers are not well adapted for heating purposes, where convenience and comfort require a heater to run the longest possible time without care. A new class of boiler has therefore come rapidly on the market. This is known as the centre or self-feeding magazine boiler, having a reservoir for coal in the centre, of sufficient capacity to hold coal enough to keep the fire from twelve to twenty-four hours, regulated according to the exigencies of the weather. This was a great and important step in the right direction, yet these boilers were not without some objections which, however, have been effectually overcome by the present house-heating boiler, put upon the market by the Gorton & Lidgerwood Company, of New York — known as the Gorton Steam Heater. These boilers are so compact and complete that they can be used for ordinary power boilers as well as for heating purposes, and are fully guaranteed for a working pressure of 100 pounds. They are built on the plan of the well-known upright tubular boiler, with the additional advantage of being self-feeding as well as surface-burning. They are so constructed that they can be used either way, because the coal reservoir (see cut) is between the lower outer surfaces of the boiler and the water-leg. This economises a space of from 9 to 12 inches in diameter out of the centre of the boiler, which is all available for active heating-surface. The reservoir is of sufficient capacity to hold enough fuel to keep up a steady fire and steam from twelve to twenty-four hours without refilling. The grate being lower in the centre, the coal steadily feeds down as it is needed. It burns hard or soft coal, or natural gas, and can be used either for circulating hot water, or for making steam. An important feature of this boiler over the old style is that the coal-pockets being placed low down any one can put on fuel, as it has only to be lifted waist high. It is easy to get at the fire and also to get at and clean the grate without dumping it, which is another important feature. The manufacturers claim that in steadiness and uniformity of heat, ease of management, ability to keep up steam without care, and economy in the use of fuel, these boilers are unequalled. An illustrated pamphlet on "*Modern House-heating*" in which will be found many interesting facts on house-heating by steam, may be had by addressing the

GORTON & LIDGERWOOD COMPANY,
96 LIBERTY STREET, NEW YORK.



Gorton Steam Heater.

BUNDY RADIATORS.

Our advertising agents often come across a manufacturer who says that he is "just getting out a very expensive catalogue, and as soon as that is off his hands he will be ready to think of advertising." Why the matter of advertising, which could be settled in half an hour, should have to wait for weeks and months until the amateur publisher has got his book before the public we never could quite see. Good catalogues are difficult and expensive things to prepare, but one way to make the money used in their preparation yield the best return is to create a demand for these catalogues, and the best way to do this is for a manufacturer to advertise the fact that he has them to place where they will do the most good. It is not an unusual thing for architects to advertise in our columns that they would like to receive catalogues, and it is certain that they do not hesitate to ask for them when they see they are to be obtained. Architects value catalogues — if they are really good and reliable, not merely showy.

One of these catalogues has just reached us which is worthy of comment not only because it is expensive and typographically handsome, but because it is well-arranged and contains facts of every-day value to architects. As we did not know that the A. A. Griffing Iron Company of Jersey City interested itself in hot-water heating we think others may be equally ignorant of this fact, and so subjoin the following comments with which are introduced to the reader's notice the various kinds and shapes of hot-water radiators which this company manufactures:

SOME OF THE ADVANTAGES OF HOT-WATER HEATING.

1. Safety from explosion, as the apparatus is open to the atmosphere through the expansion-tank.

2. The only care it requires is to keep a fire in the heater.

3. The economy is in the slow firing that is necessary to make the apparatus adequate for all purposes, resulting in a great saving of fuel.

4. It is noiseless, and a radiator can be run to its fullest capacity in a room while others are partly or entirely shut off, without interfering with the working of the apparatus.

5. There is no danger from fire, as the boiler and radiators are full of water which cannot be heated to a higher temperature than boiling water, and which cannot endanger surrounding wood-work, this, in itself should reduce your insurance one-half.

6. Hot-water radiators will heat with a low fire, while with steam radiation no heat is given off by the radiators if steam is not generated. The moment the fire is lighted the heat begins to travel, everything moves along quietly, no noise whatever, the radiators working up gradually to their maximum tempera-

ture, and there will always be more or less heat in the radiators as long as there is fire enough in the boiler to change the temperature of the water.

7. The heat of steam radiation cannot be controlled as well as that of hot water, as steam gives out about the same amount of heat whatever may be the temperature of the external air, while with hot water, as soon as the fire is lighted, the water begins to circulate and heat is given out, which heat increases until the water reaches the boiling point. The apparatus should be so constructed as to warm the building in the coldest weather, with the temperature of the water at 200°, or even less. In moderate weather the heat can be reduced by partially stopping off the circulation of the radiators or moderate firing; so by burning more or less fuel the heat can be increased or diminished at pleasure.

8. The "Bundy" combination steam and hot-water radiators can be used for steam-heat in the coldest weather, and for hot water in moderate weather, this is true of no other radiator.

9. Hot-water heat is considered very healthful for dwellings, and it is well known that in houses where hot-air furnaces were used, house plants would not thrive, but after hot water was introduced the same variety of plants were grown successfully. Quoting from an article by J. Drysdale, M.D., and J. W. Hayward, M.D., of England, published in "*The Health and Comfort in House-building*," they say: "As a proof of the healthfulness of hot-water heat, we may notice that one of us, who has lived four years in a house heated by the hot-water system, is a general practitioner of medicine, which involves being frequently called out at all hours of the day and night, yet no increased liability to cold or delicacy of any kind has been observed; on the contrary, whereas previously, when living in ordinary houses, he frequently suffered from bronchitis and quinsy, he has never had either disease since living in his present house, and a member of his family, who had previously to spend several winters in a warm climate, is now able to remain at home and go about in the open air all the year round. For prevention of disease we hold such a house to be a most important auxiliary."

10. One advantage of a hot-water apparatus is described in the discussion upon the paper by the late Robert Briggs, M. Inst. C. E., read before the Institution of Civil Engineers, at London, November 28, 1882, when Mr. T. H. Blakesley said "that the successful result of heating a passage by a hot-water apparatus, at a low temperature, would create no surprise to those who were familiar with the law which has been quoted by Mr. Anderson. At a low temperature, the proportion of heat given out by radiation was far greater than that given by convection, so that in a passage a good deal of draught was avoided by the walls being heated by radiation. Sufficient attention had not, perhaps, been bestowed upon the difference to which he had referred. At about 73° of difference, the air being at 60°, with an apparatus of cast-iron, the proportion was nearly equal, but below that, the amount given out by radiation was in excess of that given out by convection."

HILL'S SAFETY STOVE-PIPE THIMBLE.

Figure 1 represents the thimble complete, with a section cut away showing its construc-

Fig. 2.

tion. It is composed of a double cylinder, A B and C D, with an air-space of 1¼ inches between, so constructed as to be adjustable to any thickness of brick and woodwork, from 5 inches to 9¼ inches; the sections B C telescoping those of A D. The outside cylinder coming opposite the wook-work is made of tin, as tin is a non-conductor of heat. M shows an inside drip that extends around the upper half of the thimble and projecting into the

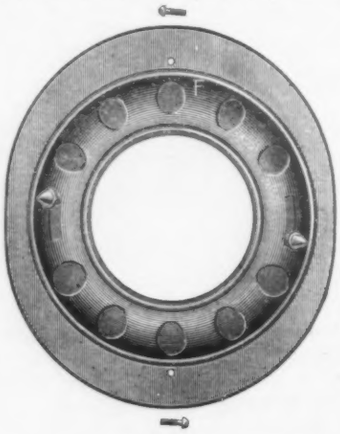


Fig 4.

chimney flue to carry off any moisture that might fall into or condense in the chimney, thus avoiding any possibility of stained walls.

Figure 2 shows an oblong collar H that is set in the partition to receive the lath and plaster, entirely independent of the thimble. Figure 3 shows the thimble as it appears when drawn out through the collar H, to receive the face F after the walls of the room are finished. If the face was removed after the partition had settled by the shrinking of the floor timbers and settling together of the wood-work, the open space shown between the thimble and the collar at the top in Figure 3 would be found at the bottom. Figure 4 shows face F.

HILL DRYER COMPANY,
26 North Foster Street, Worcester, Mass.

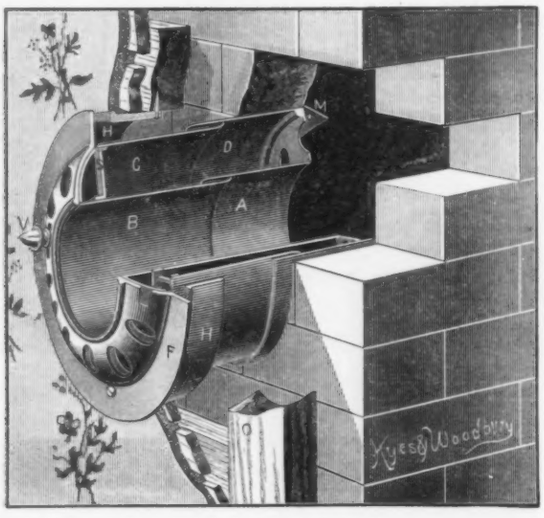


Fig. 1.

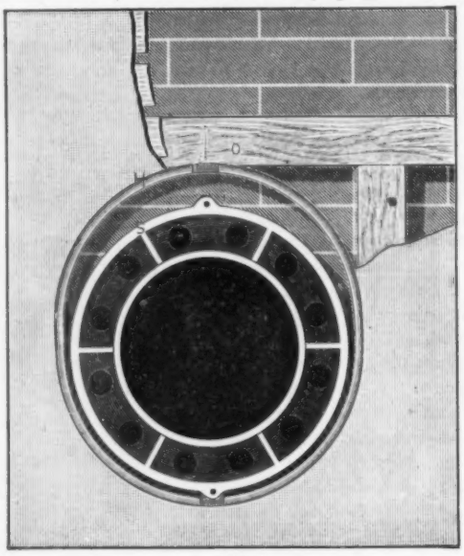


Fig. 3

SIOUX FALLS JASPER.

It will be a surprise to many of our readers to learn of an extensive deposit of quartzite located at Sioux Falls, D. T., which has been called Jasper by reason of Longfellow's reference to it as such in his "*Hiawatha*." For a long time this remarkable deposit of almost pure silica was thought to be a worthless, unworkable mass of flint. In 1880 Mr. James H. Drake, then assistant manager of the railroad from St. Paul to Sioux Falls, conceived that there were secrets to be disclosed in that stone, and, after purchasing large fields of the deposit, he bored into it with diamonds, found no symptoms of exhaustion at the depth of one hundred feet. Later he ascertained that by properly-tempered tools it could be worked cheaply into a rock-faced ashlar, very lively in color, of delicate tint, and, being a thoroughly non-absorptive stone, presented to the trade something superior to granite at much less cost. The cleavage planes were found exact, and by skilful blows it could be shaped to a line for heavy work with comparative ease. It was a bold undertaking, but Mr. Drake set himself diligently at work to develop it. The Deaf-Mute School at Sioux Falls, the Territorial Penitentiary, the University of Dakota Territory, and numerous private residences, attest the workability of stone. Under the auspices of the Drake Company, with head-quarters at St. Paul, Minn., this stone is now being introduced in the Eastern market, and to the Southwest trade. A fine house, after designs of Messrs. Gilbert & Taylor, of St. Paul, is to be built in that city upon Summit Avenue, the leading residential street, another on Dearborn Avenue, in Chicago, and a bank building in Joliet, Ill.

Prof. N. H. Winchell says of it: "I have put it to a very severe test in our laboratory with the following results: Effect of heating the stone, at a moderate heat, none; at a

red-heat, no cracking and no scaling. The red quartzite shows great endurance in the test of the laboratory as well as in the hands of nature. It is practicably indestructible for all ordinary uses. These qualities taken in connection with its great resistance to crushing, which amounts to over 25,000 pounds to the square inch, proves it to be one of the most refractory of the stones which go to make up the superficial crust of the earth; and being so hard, it will take the most perfect polish, and will serve for ornamental as well as for substantial masonry, and for interior ornamentation."

This stone promises to fill a long-felt want, is of a warm, reddish tint eagerly sought for by architects.

The Drake Company have also a find in an extensive deposit of mottled-red granite, of a soft mellow tint of red with pink and green spots. It is pronounced by those who have seen it more inviting than any red granite before the trade. Their orders are extensive for column work. They have invested over $85,000 in machinery and polishing-works at Sioux Falls, looking to the large and growing trade of that rapidly-developing region. This red granite is taken in preference to Scotch, and they are now engaged in executing a large order for column work to be shipped to San Francisco. The Drakes are also members of the syndicate extensively engaged in trying to utilize the forests of petrified wood as a decorative material, and although it may seem like shipping coal to Newcastle, they are very confident that their works at Sioux Falls will yet furnish building-stone for the Eastern markets, as already they have orders from Tiffany & Company, the jewellers, of New York, for polished jasper columns and table-tops equal to Mexican onyx. Dakota, heretofore known for its Number 1 hard wheat and gold mines, promises to be a prominent contributor in the line of building and ornamental stone in beauty and excellence of the first order.

THE DRAKE COMPANY,
ST. PAUL, MINN.

REMOVAL.

THE Manufacturers' Advertising Bureau was established in 1880, and has been located since then at Number 8 Broad Street. Owing to increase of business and the necessity for additional facilities, we have been compelled to seek more commodious quarters, and have removed to 111 Liberty Street.

The business of this bureau is to act as press agents and manage advertising for firms principally in the manufacturing, mining, and scientific journals. It numbers among its patrons many of the largest manufacturers in the United States.

We claim to attend systematically, to all of a firm's newspaper work, which includes the preparation of illustrated articles, and distribution of its advertising in a judicious manner, on a profitable basis to them. We claim to save time and money, and to secure advantages as to position and many other privileges, which only a bureau commanding the advertising of a large number of representative firms can get, to the mutual advantage of each advertiser.

We take this opportunity to return our thanks for the liberal patronage bestowed upon us in the past, and hope for a continuance of the same.

MANUFACTURERS' ADVERTISING BUREAU,
111 LIBERTY STREET, NEW YORK.
BENJ. R. WESTERN, *Treas.*
J. H. WILLIAMSON, *Business Manager.*

NOTES.

SALES of boilers made by the Babcock & Wilcox Company for March, 1887, are as follows: Singer Manufacturing Company, Montreal, Canada, 152 horse-power; United States Senate, Washington, D. C., 312 horse-power; E. Jenckes Manufacturing Company, Pawtucket, R. I., 240 horse-power; Cardenas Sugar Refinery, Cardenas, Cuba (6th order), 208 horse-power; Tennessee Coal, Iron and R. R. Company, South Pittsburgh, Tenn., 624 horse-power; Gadsden Alabama Furnace Company, Gadsden, Ala., 624 horse-power; Gorden, Strobel & Laureau, L'd, Philadelphia, Pa. (5th order), 480 horse-power; The "Journal" Company, Kansas City, Mo., 200 horse-power; J. Langdon & Company, Inc., Shamokin, Pa., 208 horse-power; Metropolitan Street Railway Company, Kansas City, Mo., 600 horse-power; Francis Axe Company, Buffalo, New York (3d order), 61 horse-power; E. C. Knight & Company, Philadelphia, Pa. (3d order) 480 horse-power; Dalzell Axle Company, South Egremont, Mass., 122 horse-power; National Tube Works Company, McKeesport, Pa., 156 horse-power; total, 4467 horse-power.

THE Wainwright Manufacturing Company, 65 and 67 Oliver Street, Boston, Mass., report shipments to the following places, during the month of April, of their Corrugated Tube Feed-water Heaters: two in Boston, one to Natick, New Bedford, Mass., Waterbury, Plainville, Ct., and New Rochelle, N. Y., three to New York City, and two to Bridgeport, Conn., aggregating 1,500 horse-power.

THE bronze hardware and ornamental metal work for the following buildings have just been completed by A. G. Newman, 1180 Broadway, N. Y: The Equitable Life Insurance Company, the Emigrant Savings Bank, the Aldrich Building, the Metropolitan Telephone Building, St. Paul's School, and many fine private residences.

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An Article long wanted but never before made.

Holds the whole harness, takes no more room than the ordinary hook or peg, can be used for both single and double harness. Gives the harness-case a neat appearance, as it carries the harness up uniformly in width with the saddle, beside keeping the bridle and breastplate in their proper shape. They are neatly japanned, with gilt facings. Price **$18** per dozen. Are now in use in over 100 first-class private stables in and about Boston.

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The public are cautioned against all similar brackets, not marked with my stamp, as such brackets are infringements of patents held by me.

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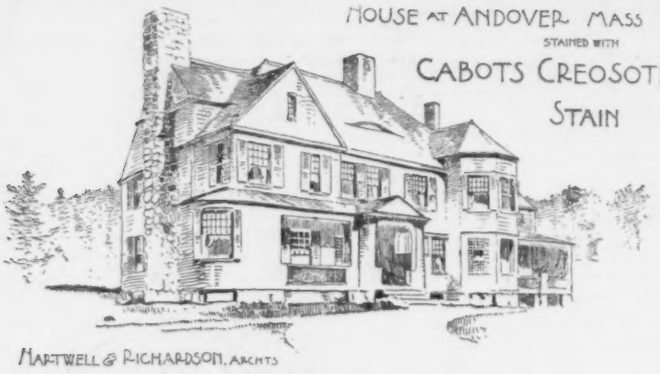

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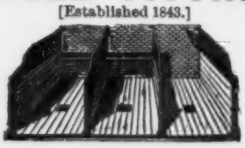

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